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INSTRUCTION BOOK

For

TRANSMITTER MODEL 96D

AND

RECTIFIER MODEL 36D



Manufactured By
WILCOX ELECTRIC COMPANY, INC.
Kansas City 6, Mo., U.S.A.

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WARNING

HIGH VOLTAGE

Is used in the operation of this equipment.

DEATH ON CONTACT

may result if operating personnal fail to observe all safety precautions.

Voltages as high as 4,500 volts are used in the operation of this equipment. These voltages are dangerous to life.

Do not change tubes or make adjustments inside the equipment with the high-voltage supplies on.

All hinged panels which can be opened by handles to give access to the inside of the equipment are provided with interlocks to shut off the equipment when the panels are opened. Panels screwed or bolted on do not have these interlocks. A few service checks must

be made inside the equipment with the high voltage on. When making these checks, always have present another person capable of rendering first aid.

Keep one hand in your pocket while making high-voltage measurements. This precaution will prevent your touching the electrical circuit with more than one part of the body at one time. High radio-frequency voltages are developed on the antenna of this equipment. Do not touch the antenna while the set is turned on.

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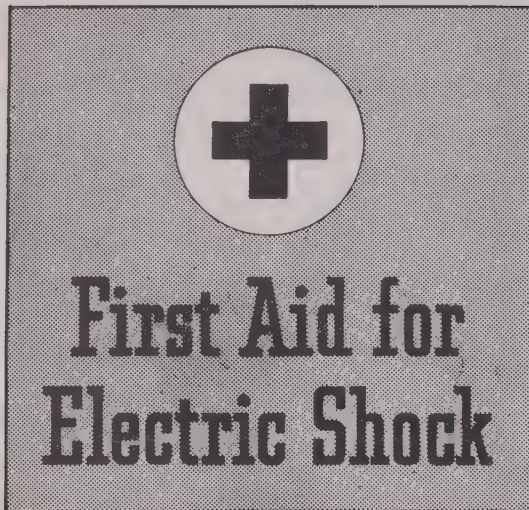
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RESCUE.

In case of electric shock, shut off the high voltage at once and ground the circuits. If the high voltage cannot be turned off without delay, free the victim from contact with the live conductor as promptly as possible. Avoid direct contact with either the live conductor or the victim's body. Use a dry board, dry clothing, or other nonconductor to free the victim. An ax may be used to cut the high-voltage wire. Use extreme caution to avoid the resulting electric flash.

SYMPTOMS.

a. Breathing stops abruptly in electric shock if the current passes through the breathing center at the base of the brain. If the shock has not been too severe, the breath center recovers after a while and normal breathing is resumed, provided that a sufficient supply of air has been furnished meanwhile by artificial respiration.

b. The victim is usually very white or blue. The pulse is very weak or entirely absent and unconsciousness is complete. Burns are usually present. The victim's body may become rigid or stiff in a very few minutes. This condition is due to the action of electricity and is not to be considered rigor mortis. Artificial respiration must still be given, as several such cases are reported to have recovered. The ordinary and general tests for death should never be accepted.

TREATMENT.

a. Start artificial respiration immediately. At the same time send for a medical officer, if assistance is available. Do not leave the victim unattended. Perform artificial respiration at the scene of the accident, unless the victim's or operator's life is endangered from such action: *In this case only*, remove the victim to another location, but no farther than

is necessary for safety. If the new location is more than a few feet away, artificial respiration should be given while the victim is being moved. If the method of transportation prohibits the use of the Shaeffer prone pressure method, other methods of resuscitation may be used. Pressure may be exerted on the front of the victim's diaphragm, or the direct mouth-to-mouth method may be used. Artificial respiration, once started, must be continued, without loss of rhythm.

b. Lay the victim in a prone position, one arm extended directly overhead, and the other arm bent at the elbow so that the back of the hand supports the head. The face should be turned away from the bent elbow so that the nose and mouth are free for breathing.

c. Open the victim's mouth and remove any foreign bodies, such as false teeth, chewing gum, or tobacco. The mouth should remain open, with the tongue extended. Do not permit the victim to draw his tongue back into his mouth or throat.

d. If an assistant is available during resuscitation, he should loosen any tight clothing to permit free circulation of blood and to prevent restriction of breathing. He should see that the victim is kept warm, by applying blankets or other covering, or by applying hot rocks or bricks wrapped in cloth or paper to prevent injury to the victim. The assistant should also be ever watchful to see that the victim does not swallow his tongue. He should continually wipe from the victim's mouth any frothy mucus or saliva that may collect and interfere with respiration.

e. The resuscitating operator should straddle the victim's thighs, or one leg, in such manner that:

(1) the operator's arms and thighs will be vertical while applying pressure on the small of the victim's back;

(2) the operator's fingers are in a natural position on the victim's back with the little finger lying on the last rib;

(3) the heels of the hands rest on either side of the spine as far apart as convenient without allowing the hands to slip off the victim;

(4) the operator's elbows are straight and locked.

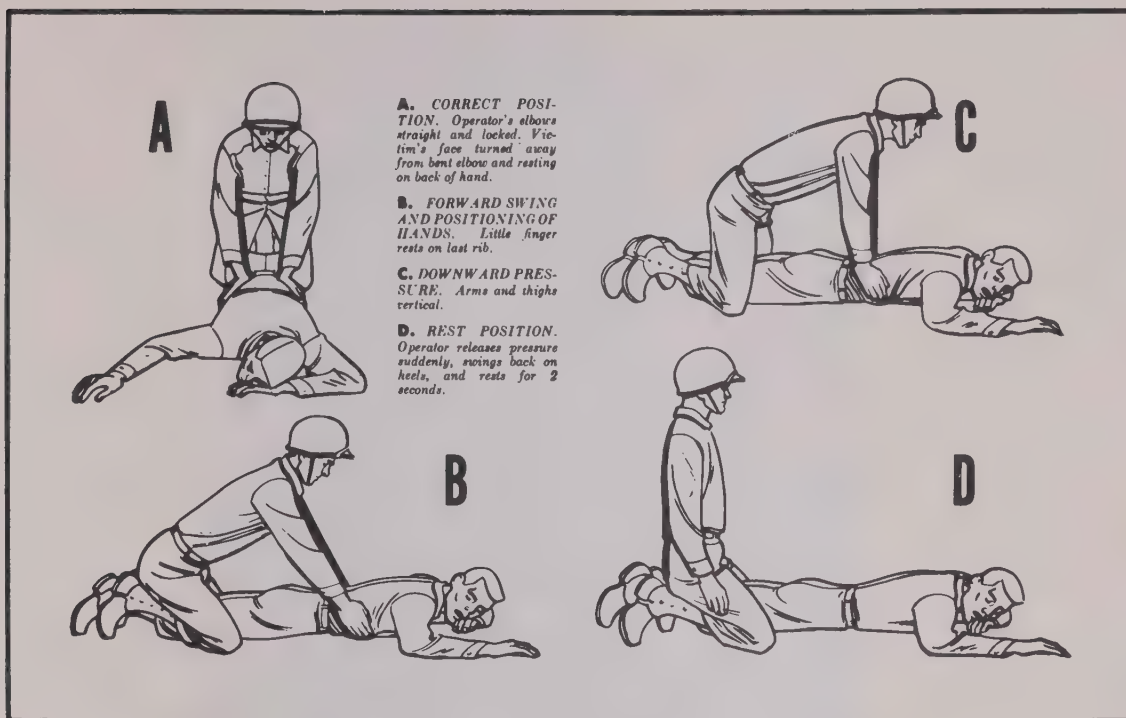
f. The resuscitation procedure is as follows:

(1) Exert downward pressure, not exceeding 60 pounds, for 1 second.

(2) Swing back, suddenly releasing pressure, and sit on the heels.

(3) After 2 seconds rest, swing forward again, positioning the hands exactly as before, and apply pressure for another second.

g. The forward swing, positioning of the hands, and the downward pressure should be accomplished in one continuous motion, which requires 1 second. The release and backward swing require 1 second. The addition of the 2-second rest makes a total of 4



seconds for a complete cycle. Until the operator is thoroughly familiar with the correct cadence of the cycle, he should count the seconds aloud, speaking distinctly and counting evenly in thousands. Example: one thousand and one, one thousand and two, etc.

h. Artificial respiration should be continued until the victim regains normal breathing or is pronounced dead by a medical officer. Since it may be necessary to continue resuscitation for several hours, relief operators should be used if available.

RELIEVING OPERATOR.

The relief operator kneels beside the operator and follows him through several complete cycles. When the relief operator is sure he has the correct rhythm, he places his hands on the operator's hands without applying pressure. This indicates that he is ready to take over. On the backward swing, the operator moves and the relief operator takes his position. The relieved operator follows through several complete cycles to be sure that the new operator has the correct rhythm. He remains alert to take over instantly if the new operator falters or hesitates on the cycle.

STIMULANTS.

a. If an inhalant stimulant is used, such as aromatic

spirits of ammonia, the individual administering the stimulant should first test it himself to see how close he can hold the inhalant to his own nostril for comfortable breathing. Be sure that the inhalant is not held any closer to the victim's nostrils, and then for only 1 or 2 seconds every minute.

b. After the victim has regained consciousness, he may be given hot coffee, hot tea, or a glass of water containing $\frac{1}{2}$ teaspoon of aromatic spirits of ammonia. *Do not give any liquids to an unconscious victim.*

CAUTIONS.

a. After the victim revives, keep him LYING QUIETLY. Any injury a person may have received may cause a condition of shock. Shock is present if the victim is pale and has a cold sweat, his pulse is weak and rapid, and his breathing is short and gasping.

b. Keep the victim lying flat on his back, with his head lower than the rest of his body and his hips elevated. Be sure that there is no tight clothing to restrict the free circulation of blood or hinder natural breathing. Keep him warm and quiet.

c. A resuscitated victim must be watched carefully as he may suddenly stop breathing. *Never leave a resuscitated person alone until it is CERTAIN that he is fully conscious and breathing normally.*



Figure 1. Radio Transmitter MODEL 96D



Figure 2. Rectifier Power Unit MODEL 36D

CHAPTER 1

INTRODUCTION

1. Scope

This instruction book contains instructions for installation, operation, maintenance, and repair of Radio Transmitter Model 96D and Rectifier Power Unit Model 36D (figs. 1 and 2). In addition to these instructions there are two appendixes covering an interconnecting wiring table and an identification table of parts.

2. Purpose and Use

a. Radio Transmitter Model 96D (fig. 1) is designed to generate 2,500 watts of carrier power at any frequency from 2.0 to 26.0 mc (megacycles). In conjunction with its associated control and power equipment, the transmitter may be used for c-w (continuous-wave) mcw (modulated continuous wave), voice-modulated, or carrier-shift teleprinter transmission. It is designed primarily for point-to-point and ground-to-air signal communications.

(1) The transmitter can be amplitude-modulated from a separate source such as Wilcox Modulator Type 50H. Rectifier Power Unit Model 36D furnishes the power for the transmitter. Remote Control Console Model CS-212 can be used to control the operation of the transmitter. This equipment is intended for use as a fixed field station. A typical and complete installation is shown in figure 5.

(2) The transmitter is assembled in a steel cabinet 73-1/2 inches high, 12-5/16 inches wide, and 27-3/4 inches deep. All the controls and adjustments are accessible at the front of the transmitter (fig. 3). Two ammeters, located at the top front of the transmitter, give visual indication of the current flow through various circuits. All of the transmitter circuit and relay equipment is mounted on a slide which may

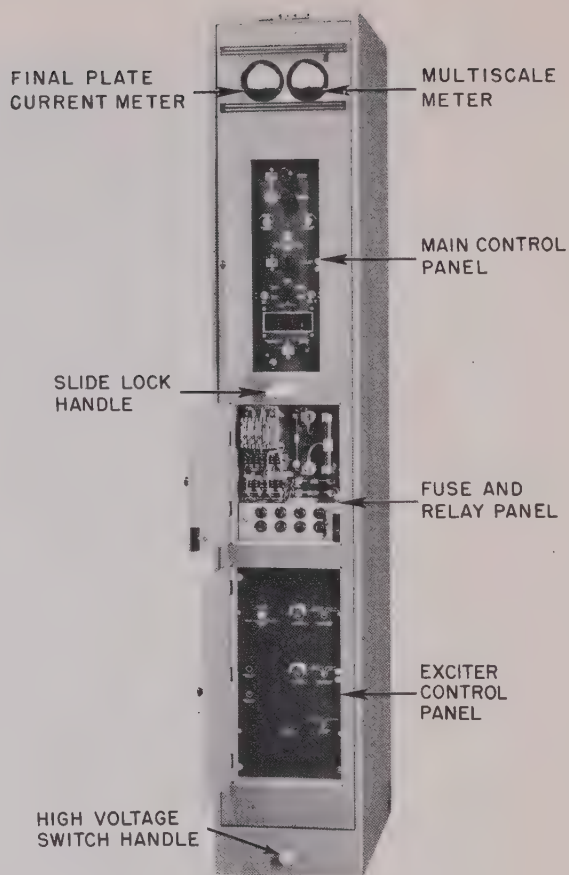


Figure 3. Radio Transmitter MODEL 96D, operating components

be pulled out to expose the equipment.

b. Rectifier Power Unit Model 36D (fig. 2) is a single unit which contains four separate full-wave power supply rectifiers. These power supply rectifiers are a 4,200-volt plate supply; a 525-volt plate supply; a -450-volt r-f (radio-frequency) bias supply; and a 12-volt, d-c (direct-current) supply. All of the above outputs are filtered. Half-wave rectification in the 4,200-volt plate supply rectifier results in a 2,100-volt plate supply that is also filtered. For certain types of transmitter operation, 4,200 volts unfiltered is available in the rectifier. The 12-volt d-c supply is used for the operation of relays and the interlock system in the rectifier and associated equipment. In addition to the

power supplies, the rectifier contains part of the relay equipment for the selection and keying of the associated transmitters. The power output of the rectifier is sufficient to meet the power requirements of three transmitters and a modulator operating simultaneously.

(1) The rectifier converts 220-volt, three-phase, 60-cycle power, which is obtained from an external power source, into the correct type of power required for the operation of Radio Transmitter Model 96D and associated equipment.

(2) The rectifier is housed in a built-up steel cabinet 72 inches high, 29-1/2 inches wide, and 27-3/4 inches deep. The components of the rectifier are mounted on four built-in steel shelves. Both the front and rear of the rectifier cabinet are equipped with doors or panels to provide complete and easy access to the equipment. Four voltmeters are located at the top front of the cabinet. Three of the voltmeters give visual indication of the output voltages, and the fourth gives visual indication of the input voltage. When the door on the front of the rectifier is opened, the control panel and various safety panels are exposed. All the controls for the operation of the rectifier are located on the control panel (fig. 4).

3. Application of Equipment

a. Radio Transmitter Model 96D is designed for use in a fixed field installation. The transmitters are generally used in groups of two or more and, with associated power and control equipment, form a large fixed installation. The transmitters are used for point-to-point and ground-to-air signal communications.

b. Rectifier Power Unit Model 36D is designed to supply the power requirements of one to three transmitters and their associated equipment.

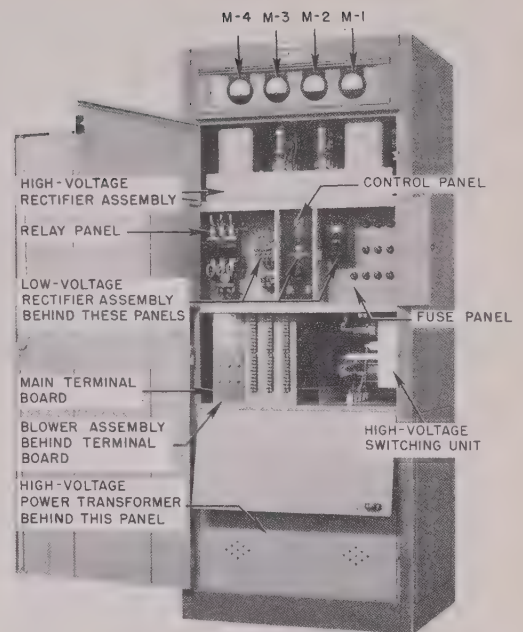


Figure 4. Rectifier Power Unit MODEL 36D, operating components

4. Typical Installation

Figure 5 is a simplified block diagram showing a typical installation that uses six transmitters, two rectifiers, and the associated modulator and controlling equipment. Power is supplied to the transmitters from the rectifiers and modulated plate voltage is supplied from the Wilcox Modulator Type 50H. The transmitting equipment is usually controlled by Remote Control Console CS-212. With this type of remote control, any number of transmitting channels up to nine may be controlled. Two Rectifier Power Units Model 36D are required to supply the power for four or more transmitters.

5. Technical Characteristics

a. Radio Transmitter Model 96D.

Frequency range:

One preset channel.....Any frequency

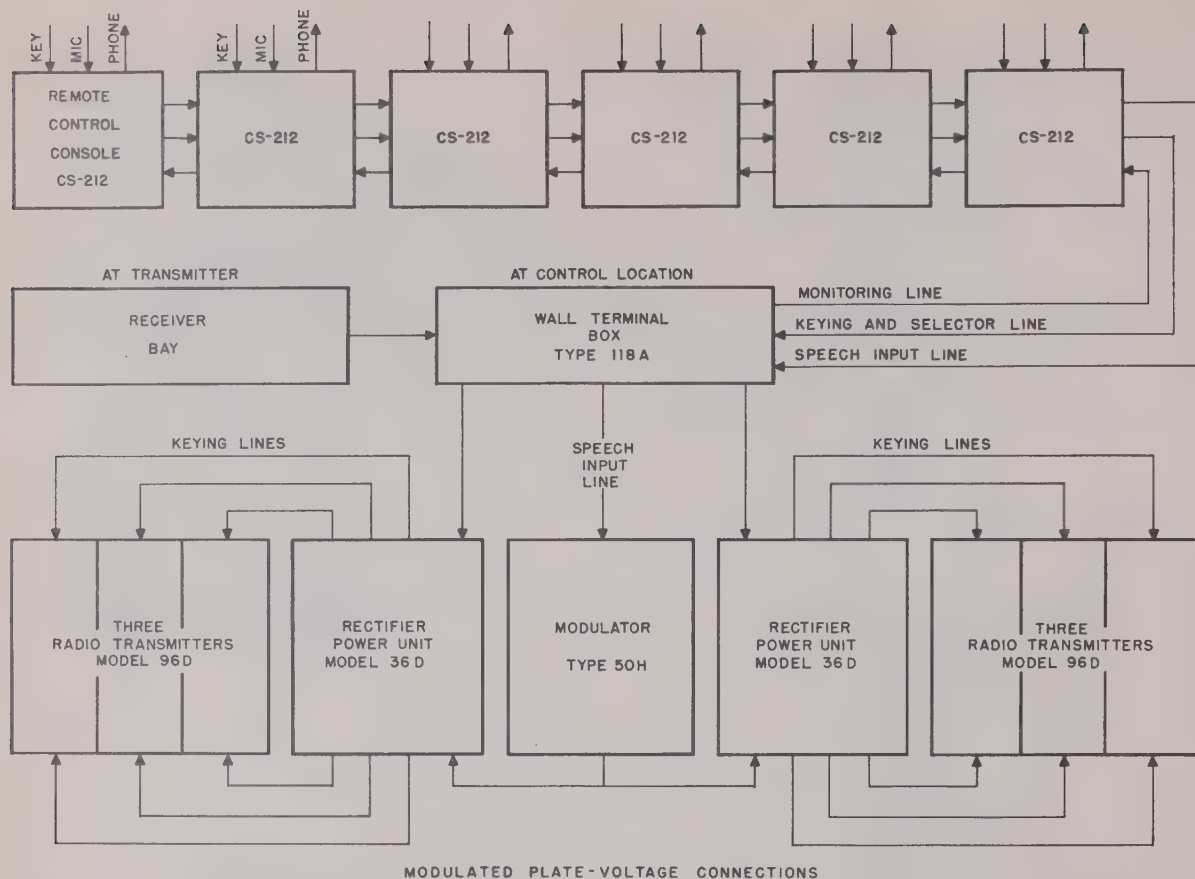


Figure 5. Block diagram of complete installation

between 2.0 and 26.0 mc.

Transmitter type....Master oscillator (crystal-controlled) or externally exciting oscillator, amplifier-doubler and power amplifier.

Types of signals transmitted....C-w, mcw, voice, and carrier-shift teletypewriter.

Type of modulation....Amplitude.

Distance range....500 to 10,000 miles, depending upon frequency and time of day.

Number of tubes.....9.

Power input:

4,200 volts dc $\pm 5\%$ 0.85 ampere.

2,100 volts dc $\pm 5\%$ 0.175 ampere.

525 volts dc $\pm 5\%$ 0.10 ampere.

-450 volts dc $\pm 10\%$ 0.40 ampere.

220 volts ac (alternating current).....3.0 amperes.

Power output:

C-w, mcw, voice-modulated, or carrier-shift teletypewriter....2,500 watts nominal.

Antenna....500 to 600 ohms impedance (balanced or unbalanced).

Power Supply.....Rectifier Power Unit Model 36D, 220 volts ac, three phase, 60 cycles.

Weight.....320 pounds.

b. Rectifier Power Unit Model 36D.

Power input.....14.7 kw (kilowatts) or 14.9 kva (kilovoltamperes); 220 volts ac, three-phase, 60 cycles or 440 volts ac, three phase, 50-60 cycles (utilizing neutral wire to obtain 220 volts); power factor 98 percent.

Power output (nominal):

4,200 volts dc filtered or unfiltered.....
3.0 amperes.

2,100 volts dc filtered.....0.5 ampere.

525 volts dc filtered.....0.45 ampere.

-450 volts dc filtered.....0.225 am-
pere.

12 volts dc filtered.....4.0 amperes.

Number of tubes.....9.

Weight.....1,895 pounds.

a. When packaged for export ship-
ment, the components of Radio Trans-
mitter Model 96D and Rectifier Power
Unit Model 36D are placed in moisture-
proof - vaporproof containers and pack-
ed in seven wooden export containers.
The size, weight, and volume of each
container are given in the following
charts:

Note. Items may be packaged in a
manner different from that shown, de-
pending upon supply channel.

6. Packaging Data

(1) Radio Transmitter Model 96D.

Number of container	Height (in.)	Width (in.)	Depth (in.)	Volume (cu ft)	Unit weight (lb)
2/3	22-1/2	27-1/2	15	5.5	75
3/3	22	23	33	10.0	150
1/3	97	53	37	110.2	1,000
Total weight (lb)					1,225

(2) Rectifier Power Unit Model 36D.

Number of container	Height (in.)	Width (in.)	Depth (in.)	Volume (cu ft)	Unit weight (lb)
1/4	85	42	33	68.0	700
2/4	17-1/2	26-1/2	34-1/2	9.0	276
3/4	17-1/8	30-1/4	32-7/8	11.25	320
4/4	38	27	30	18.0	1,325
Total weight (lb)					2,621

b. The contents of each case are
given in the table of components (par.
7). See the packing list attached to
each case for exact contents.

7. Table of Components

a. Radio Transmitter Model 96D.

Component	Required No.	Height (in.)	Depth (in.)	Width (in.)	Volume (cu ft)	Unit weight (lb)
Package 1/3:						
Radio Transmitter	1	73-1/2	27-3/4	12-5/16	12.6	320

a. Radio Transmitter Model 96D (contd.)

Component	Required No.	Height (in.)	Depth (in.)	Width (in.)	Volume (cu ft)	Unit weight (lb)
Package 3/3:						
Set of operating fuses	1	4-1/2	3	6	0.05	1
Set of spare fuses	5	7-1/2	6	6-1/2	0.20	3.25
Set of operating tubes	1	29-1/2	29	14-1/2	7.30	28
Set of spare tubes	1	29-1/2	14-1/2	14-1/2	3.90	15
Set of coils except final plate coil	1	22-1/2	17-1/2	17-1/2	1.80	33
Capacitors, vacuum	2	-	-	-	-	-
Lead, electrical (final plate tuning link)	1	7	12	12	0.60	6
Crystal unit	1	-	-	-	-	-
Technical manual,	2	-	-	-	-	-
Package 2/3:						
Capacitor, glass, variable	1	7-1/2	7-1/2	19	0.62	5
Coil, final amplifier plate	1	12-1/2	11-1/2	22	1.9	12
Capacitor, final amplifier blocking	1	6-1/2	6-1/2	10	0.25	4
Capacitor, air, variable	1	6-1/4	6-1/2	20-1/4	0.50	8

b. Rectifier Power Unit Model 36D.

Component	Required No.	Height (in.)	Depth (in.)	Width (in.)	Volume (cu ft)	Unit weight (lb)
Package 1/4:						
Rectifier Power Unit	1	72	27-3/4	29-1/2	30.1	450
Wall Terminal Box						5
Cable Assemblies						18
Installation Kit						6
Set of operating fuses	1	4-1/2	3	6	0.05	1
Set of spare fuses	1	7-1/2	6	6-1/2	0.20	3.25
Resistor, JAN MFA505	1	7	6-1/2	15	0.4	2.50
Set of operating tubes	1	9	12-1/2	18-1/4	1.2	7
Set of spare tubes	1	7-1/2	12-1/2	9-1/2	0.5	4
Switch, vacuum	5	6-1/2	9-1/4	12-1/4	0.4	2.5

b. Rectifier Power Unit Model 36D (contd.)

Component	Required No.	Height (in.)	Depth (in.)	Width (in.)	Volume (cu ft)	Unit weight (lb)
Technical manual,	2	1	10	13	0.10	2
Package 4/4:						
Transformer, power supply	1	28/3/4	21-1/4	15-1/2	5.5	1,200
Package 3/4:						
Rectifier component, high-voltage	1	6-3/8	22-1/2	17-5/8	1.5	260
Package 2/4:						
Rectifier component, low-voltage.	1	10.7/8	22-1/2	11-5/8	1.7	225

8. Radio Transmitter Model 96D

a. General. Radio Transmitter Model 96D is a nine-tube, crystal-controlled or external excited, amplifier-doubler, power-amplifier transmitter designed to transmit c-w, mcw, a-m (amplitude-modulated) or carrier-shift teletypewriter signals within the frequency range of 2.0 to 26.0 mc. The transmitter is housed in a built-up metal cabinet. Figure 6 is a view of the transmitter slide with the control panel doors open, and figure 7 is a rear view of the transmitter. Figure 8 is a left-side view of the transmitter with the slide pulled out to expose the wiring of the unit. The interior of the cabinet is shown in figure 9.

b. Instrument Panel. The instrument panel is located at the top front of the cabinet. Two ammeters, mounted on the panel, are used for checking the current in each of six different circuits. The multiscale ammeter, M-2, indicates the current in the grid circuits of the second, third, and final amplifier stages, the plate current of the second amplifier stage, and the total current of the

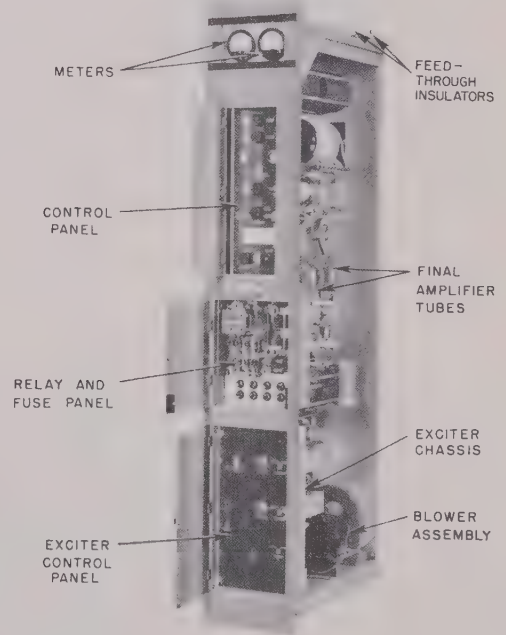


Figure 6. Radio Transmitter MODEL 96D, right side view of slide, control panel doors open

third amplifier stage. This meter is connected into the various circuits, one at a time, by means of the METER SWITCH, S-4 which is on the control panel. Ammeter M-1 indicates the final amplifier total current and is permanently connected in the cathode circuit of the final amplifier stage.

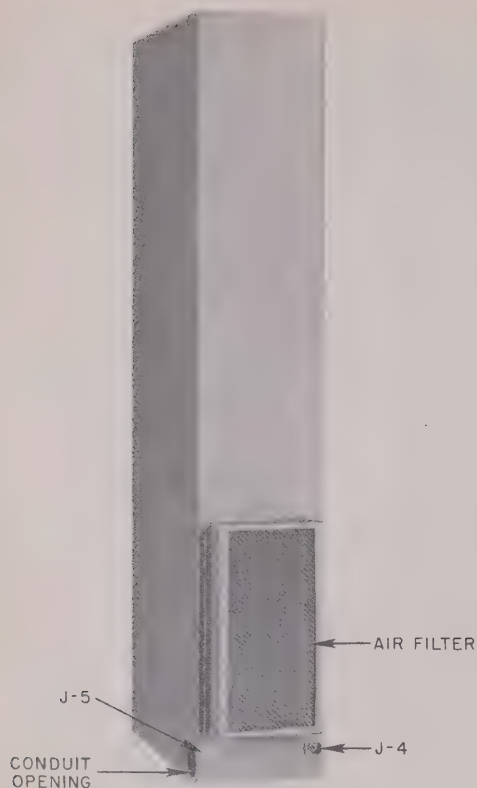


Figure 7. Radio Transmitter MODEL 96D, rear view

c. Control Panel. The control panel, located on the front of the slide, has five tuning controls (of which only four have counters), three switches, and two screw-driver adjustments. The final amplifier tubes are visible through a window which is cut in the panel. Access to the control panel is obtained by pulling open a door on the front of the slide.

d. Slide. The slide has all of the transmitter circuits and relay equipment mounted upon it. The only component not mounted on the slide is the h-v (high-voltage) switch, which is mounted in the base of the cabinet. The construction of the slide is shown in figures 6 and 8. To move the slide forward, turn the slide lock handle (fig. 3) at the front of the transmitter a quarter turn to the left to unlatch the slide.

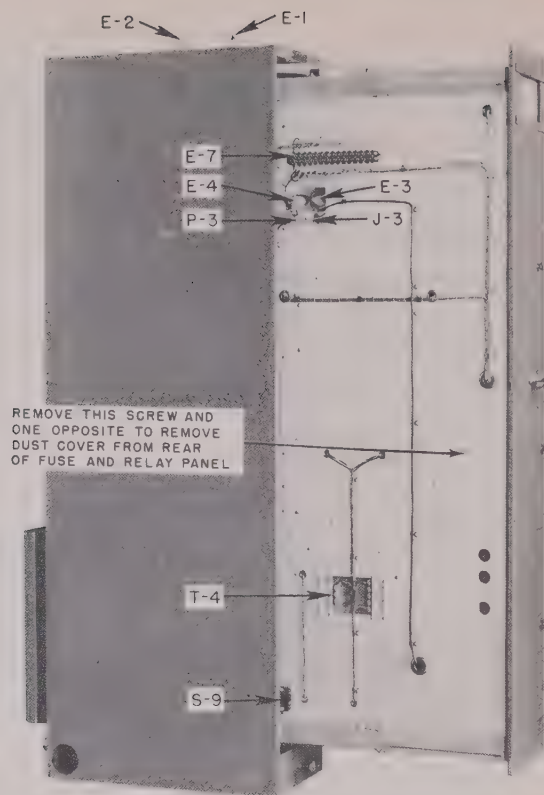


Figure 8. Radio Transmitter MODEL 96D, left side view with slide out

The slide can now be pulled out. All electrical connections to the slide are made with flexible cables and leads. When the slide is pulled out, an inter-lock switch is opened and the 4,200-volt, 2,100-volt, and 525-volt potentials are removed from the slide.

Caution: The -450-volt power is present when the slide is pulled out unless the h-v switch (fig. 3) is opened or the rectifier is shut down.

e. Exciter Unit. The exciter unit is mounted on the slide as shown in figure 6. The exciter unit consists of the crystal-controlled oscillator, the first and second amplifiers, all but the plate circuit of the third amplifier, the electronic keying circuit, the electronic channel control circuit, and the bias isolator circuit.

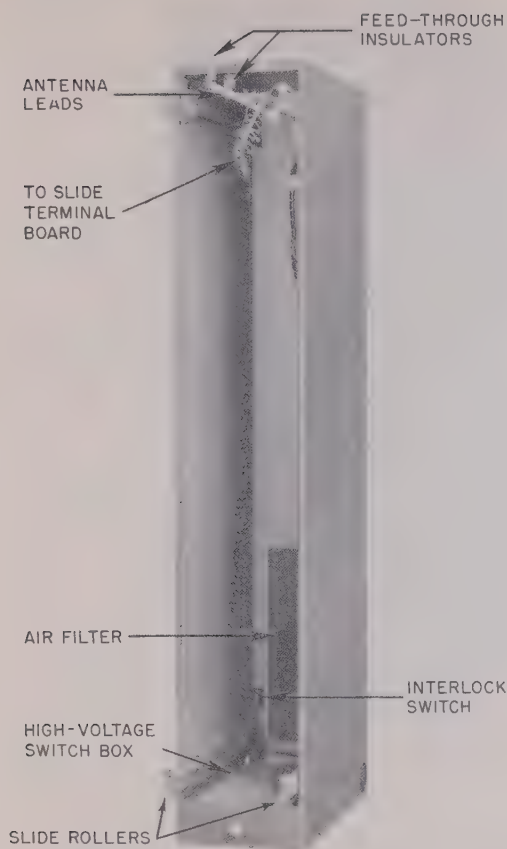


Figure 9. Radio Transmitter MODEL 96D,
view of cabinet with slide removed

f. Final Amplifier and Antenna Loading Network. The components of the final amplifier and the antenna loading network are mounted on the top half of the slide as shown in figure 6. Antenna feed connections are made to two feed-through insulators located at the top of the slide and then by means of two flexible straps to feed-through insulators in the top of the cabinet, as shown in figure 9.

g. Fuse and Relay Panel. The fuse and relay panel is located at the center front of the slide. Mounted on the panel are five relays, sockets for eight fuses, and clips for five fuses. One set of clips marked TUNE ONLY is used during the tune-up procedure (par. 32). The fuses are for the protection of the

equipment. The relays are for equipment protection and for remote operation of the transmitter.

h. Blower Assembly. The blower assembly, mounted at the bottom of the slide (fig. 6), consists of the motor, blower, and blower housing. Air is drawn in from the outside of the cabinet through a filter (fig. 7) and forced through the slide by the blower assembly. This provides the necessary cooling of the equipment during operation.

i. High-Voltage Switch. The high-voltage switch is located at the bottom of the transmitter cabinet (fig. 9). A handle, located at the bottom front of the cabinet (fig. 3), operates the switch. When the handle is out, the switch is open and all d-c voltages are removed from the transmitter. The interlock circuit within the transmitter is bypassed when the switch is fully opened, allowing the operation of other equipment in the station.

9. Rectifier Power Unit Model 36D.

a. General. Rectifier Power Unit Model 36D has four full-wave rectifiers with filtered output designed to supply the power requirements of one to three transmitters and associated equipment. The rectifier is housed in a built-up metal cabinet with access doors and panels at the front and back of the unit. Figure 10 is a front view of the unit, and figure 11 is a rear view. Figure 12 is a rear view of the unit with the panel off. The components of the rectifier are mounted on four built-in shelves.

b. Instrument Panel. Located at the top front of the unit are four voltmeters mounted on the instrument panel. These meters are the AC LINE, RF BIAS, LOW RF PLATE, and FINAL PLATE. The meters are designed to aid in the operation and presetting of the equipment.

c. Control Panel And Safety Doors

And Panels. Opening the large front door exposes the various safety doors and the control panel (fig. 10). These doors are designated as follows: The top door, A, incloses the high-voltage rectifier assembly; door B, to the right of the control panel, incloses the fuse panel; door C, to the left of the control panel, incloses the relay panel; door D, below the control panel, incloses the mainterminal board and the h-v switching unit; and large panel E, at the bottom of the cabinet, incloses the h-v power transformer. The back of the rectifier is covered by a large metal panel secured to the cabinet by quick-release fasteners. Mounted on the rear panel is the air filter (fig. 11). The rear panel and the doors inclosing the main terminal board and the h-v rectifier are equipped with interlock switches for the protection of personnel.

d. Low-Voltage Rectifier Assembly (fig. 13). The l-v (low-voltage) rectifier assembly is mounted on the second

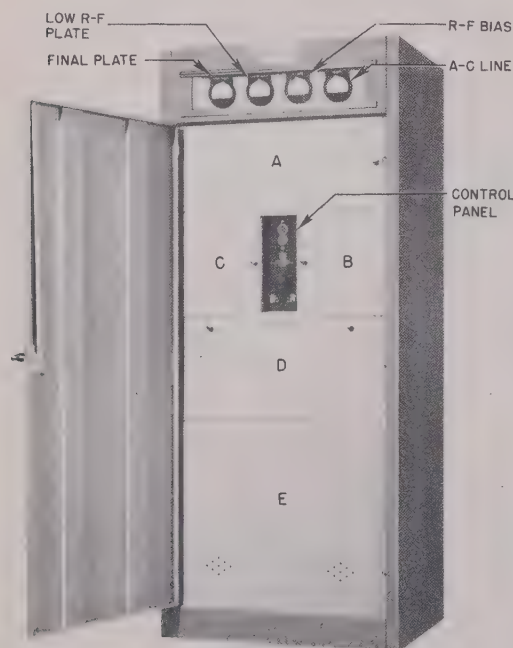


Figure 10. Rectifier Power Unit
MODEL 36D, front view with door
opened

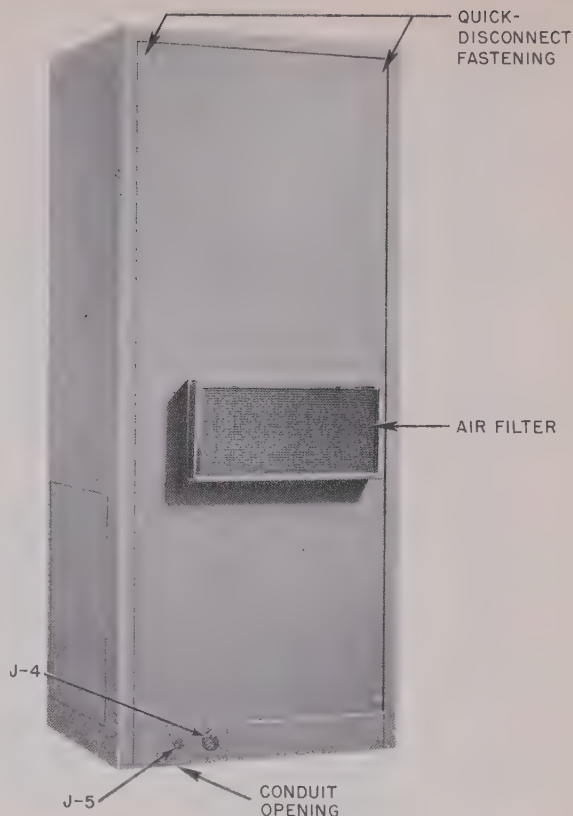


Figure 11. Rectifier Power Unit
Model 36D, rear view. (Jacks
J-4 and J-5 are optional items).

shelf from the top of the rectifier cabinet behind the control, fuse, and relay panels (fig. 12). The l-v rectifier supplies the 525-volt l-v plate power, the -450-volt r-f bias power, and the 12-volt d-c power. The 525-volt power and -450-volt power are used in the associated transmitters. The 12-volt d-c power is used in the control circuits in the rectifier and in the interlock circuit which is common to the rectifier and all associated transmitters and modulators. Connections to the l-v rectifier assembly are made by means of a plug and jack combinations.

e. High-Voltage Rectifier Assembly (fig. 14). The h-v rectifier assembly is mounted on the top shelf of the rectifier cabinet (fig. 12). The h-v rectifier assembly furnishes the 4,200-volt filtered power, the 4,200-volt unfiltered

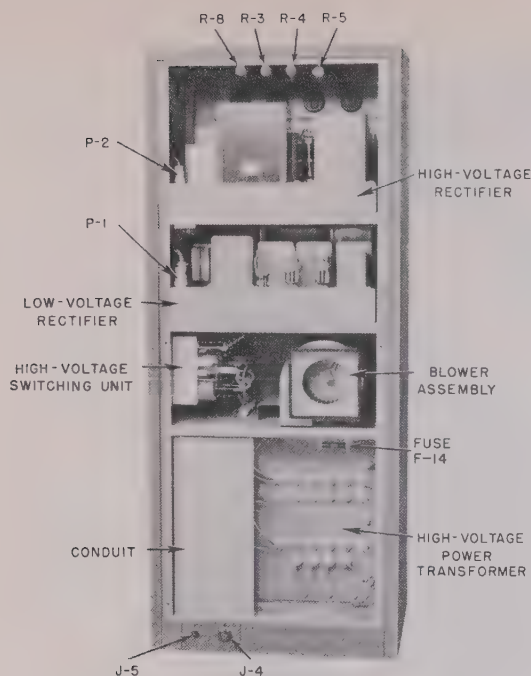


Figure 12. Rectifier Power Unit Model 36D, rear view with panel removed. Transformer is the type used with Rectifier system, figure 94.

power, and the 2,100-volt filtered power. The 4,200-volt filtered power is modulated by the associated modulator and then becomes the plate supply for the final amplifier stage of the associated transmitters. The 4,200-volt unfiltered power is used directly in the associated transmitter for certain types of operation, such as c-w. The 4,200-volt filtered supply is used for the modulator and for carrier-shift teletypewriter operation. The 2,100-volt power is used in the associated transmitters as the plate supply for the third r-f amplifier stage. High-voltage connections are made to component terminals inside the h-v rectifier chassis. Power for the filament transformers is connected to the h-v rectifier assembly by a plug and jack combination.

f. High-Voltage Switching Unit. The h-v switching unit is mounted to the right side of the rectifier cabinet, between the second and third shelves (fig. 12). The function of the h-v switching unit is to switch each transmitter to the

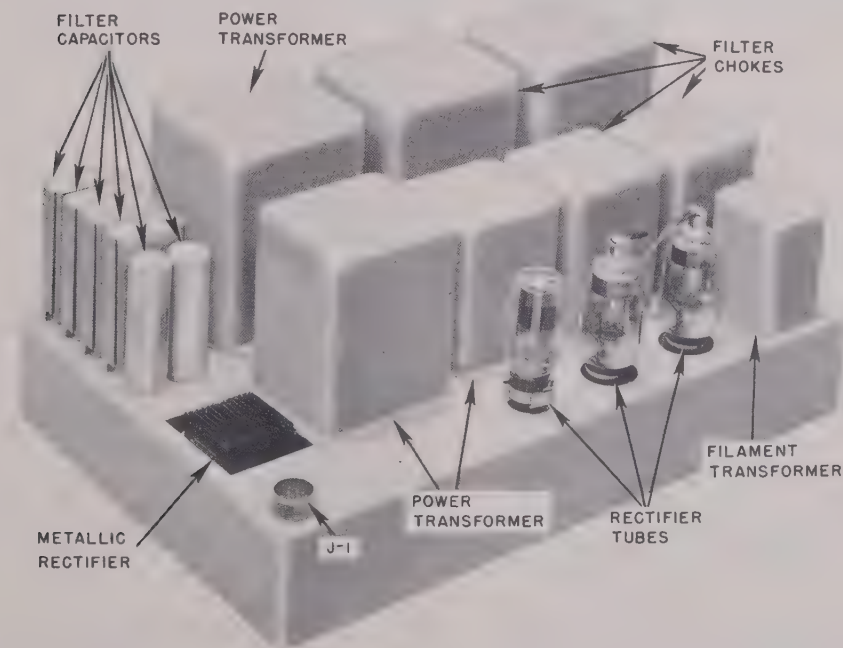


Figure 13. Rectifier Power Unit Model 36D, low-voltage rectifier assembly

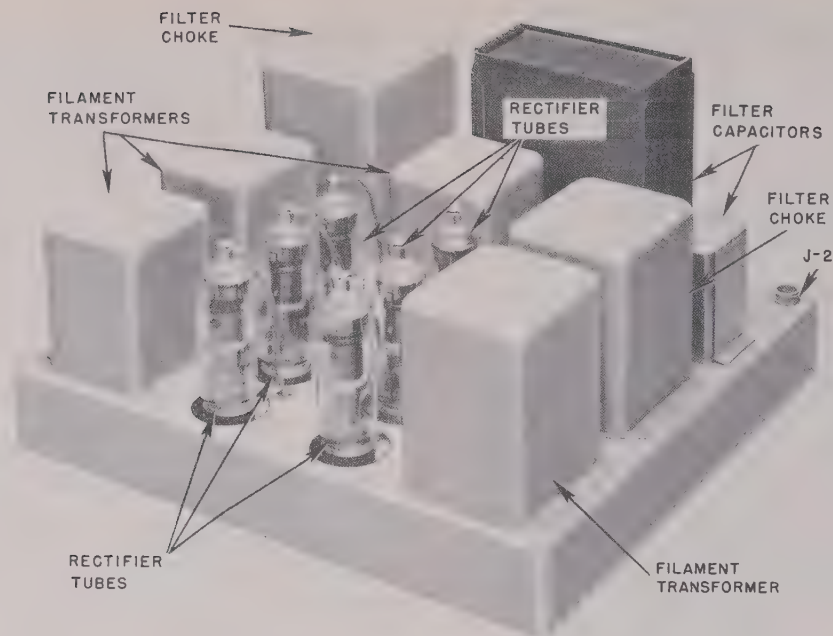


Figure 14. Rectifier Power Unit Model 36D, high-voltage rectifier assembly

4,200-volt d-c unfiltered supply or to the modulated 4,200-volt plate supply. Connections from each transmitter are made directly to insulators on the h-v switching unit. A connection is made between the tall insulator on the switching unit and the unfiltered 4,200-volt terminal, E-3, in the cabinet.

g. High-Voltage Power Transformer (fig. 12). The h-v power transformer is mounted on the bottom shelf of the rectifier cabinet. The power transformer is an integral part of the h-v rectifying system. The function of the transformer is to step up the 220-volt a-c power to provide power for the 2,100 and 4,200-volt supplies. Connections to the power transformer are made at stand-off insulators at the rear (or front) of the unit.

h. Blower Assembly (fig. 12). The blower assembly is mounted on the third shelf from the top, behind the main terminal board of the rectifier cabinet. When the back panel is mounted in place,

the air filter covers the intake opening in the blower assembly. The blower draws air through the filter, thus removing dust and dirt, and forces air over the components within the rectifier cabinet.

i. Fuse, Relay, and Control Panels (fig. 15). The fuse, relay, and control panels are mounted between the first and second shelves. The control panel is in the center, and mounted on it are five controls used for normal operation. The fuse panel is to the right of the control panel and has 13 fuses and the circuit breaker mounted on it. Mounted on the relay panel, which is at the left of the control panel, are three relays and the h-v primary contactor.

10. Minor Components and Running Spares (Optional Equipment)

a. The minor components consist of a 24-terminal wall terminal box, a 16-

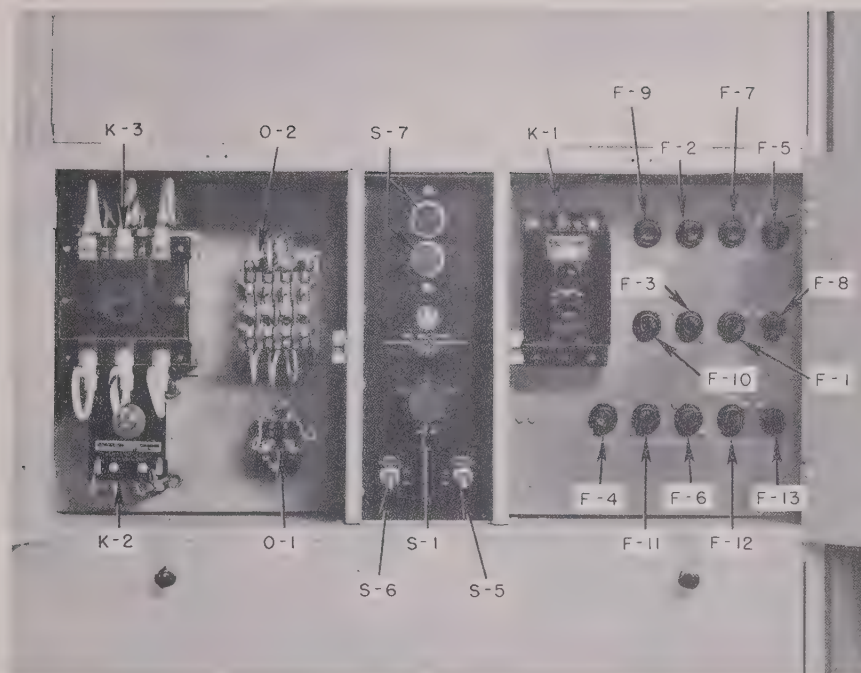


Figure 15. Rectifier Power Unit Model 36D,
fuse, relay, and control panels

conductor, a cable assembly 20 feet long, a 3-conductor, a cable assembly 20 feet long and an installation kit. The installation kit consists of the following:

(1) Wire #18 AWG, 15,000 volts.

9 feet, blue
9 feet, red
9-1/2 feet, yellow
10 feet, white
10-1/2 feet, green
11-1/2 feet, black
12 feet, brown

(2) Wire #18 AWG, 2,500 volts.

18-1/2 feet, red

(3) Wire #18 AWG, 1,000 volts.

9 feet white with wide brown

tracer (wh-br w)

33-1/2 feet, black

13 feet, brown

14 feet, brown with wide white tracer (br-ww)

15 feet, black with wide yellow tracer (blk-yel w)

16 feet, black with wide green tracer (blk-gr w)

17 feet, blue

13 feet gray with wide black tracer (gray-blk w)

14 feet, gray with wide red tracer (gray-red w)

19-1/2 feet, white

24 feet, white with wide black tracer (wh-blk w)

17 feet, gray

16 feet, gray with wide blue

tracer (gray-bl w)
15 feet, gray with wide yellow
tracer (gray-yel w)

(4) Wire #22 AWG, 1,000 volts.

18-1/2 feet, red
18-1/2 feet (red-wh w)
16 feet, white with narrow black
tracer (wh-blk n)
16 feet (wh-br n)
16 feet (wh-red n)
16 feet, white with narrow orange
tracer (wh-or n)
16 feet (white-gr n)

(5) Wire #14 AWG, 1,000 volts.

16 feet (wh)
49 feet (gray)
36-1/2 feet (gray - blk w)
68 feet (gray - yel w)
16 feet (wh -red w)

(6) Wire shielded pairs, #22 AWG,
1,000 volts.

10-1/2 feet (wh and wh-blk w)
11-1/2 feet (wh-gray w and wh-
br w)
13-1/2 feet (wh-bl w and wh-or
w)
14-1/2 feet (wh-gr w and wh-
yel w)
16 feet (wh-red w and wh-bl w)
12-1/2 feet (wh-purple w and
wh-red w)

(7) Terminal lugs.

150 Thomas and Betts No. A77G,
Wilcox No. 25012
35 Thomas and Betts No. B36G,
Wilcox No. 25010
40 Thomas and Betts No. A36G,
Wilcox No. 25011
25 Thomas and Betts No. B72G,
Wilcox No. 25009

(8) Hardware.

24 1/4-inch ID (inside diameter)
compression lockwashers
24 1/4 - 20 hexagonal machine
screw nuts
24 3/8-inch by 1/4-20 right-
hand machine screws
24 1/4-inch ID flat metal washers

30 2-1/2 by 3/8 inch lag screws
30 7/16-inch ID flat metal wash-
ers
6 #7 x 1 inch right-hand wood
screws

(9) Tools.

1 fuse puller
1 No. 4 Allen wrench
1 No. 6 Allen wrench
1 No. 8 Allen wrench
1 No. 10 Allen wrench
1 1/4-inch Allen wrench
1 1/2-inch Tee-handle reamer
1 log screw socket wrench
1 1/2-inch ratchet brace
1 (set) open and box end wrenches
sizes 1/4, 5/16, 3/8, 7/16, 1/2,
9/16

b. A group of running spares is sup-
plied with each transmitter and recti-
fier. Spares are provided for all nor-
mally expendable items such as tubes
and fuses. The following subparagraphs
list the running spares:

(1) Radio Transmitter Model 96D:

20 fuses, 1 ampere, 250 volts
10 fuses, 2 amperes, 250 volts
10 fuses, 2.5 amperes, 250 volts
10 fuses, 0.5 ampere, 1,000 volts
5 fuses, 0.75 ampere, 2,500 volts
5 fuses, 1.5 ampere, 5,000 volts
1 Tube JAN-6AC7W
1 Tube JAN-6J5
1 Tube JAN-6SN7-W
1 Tube JAN-807W
1 Tube JAN-811
1 Tube JAN-813
1 Tube JAN-450TL

11. Additional Equipment Required

The following equipment is not sup-
plied with Radio Transmitter Model 96D
and Rectifier Power Unit Model 36D
but is necessary for the full operation
of the equipment.

Modulator Unit Type 50H and
Remote Control Console Type
CS-212.

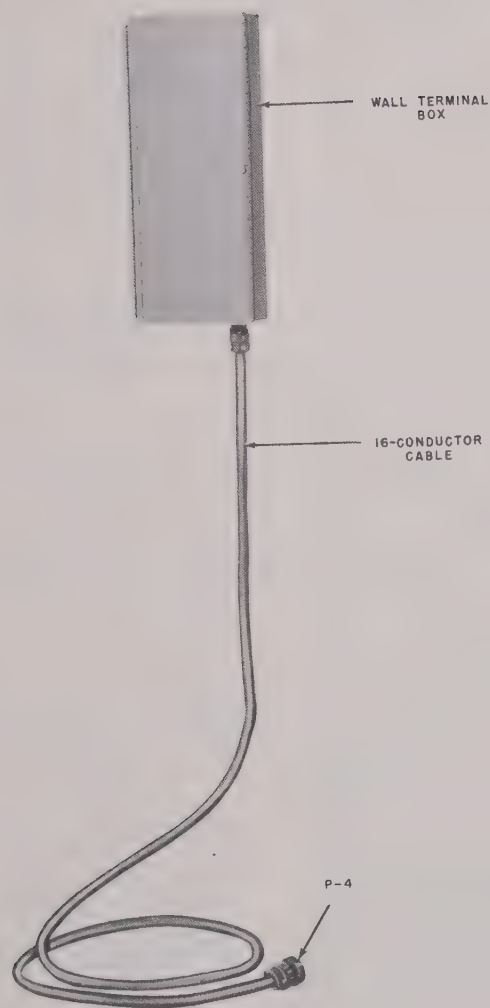


Figure 16. Wall terminal box and interconnecting cable. (Optional Equipment)

CHAPTER 2

OPERATING INSTRUCTIONS

SECTION I. INSTALLATION OF RADIO TRANSMITTER MODEL 96D AND RECTIFIER POWER UNIT MODEL 36D

12. Siting

a. External Requirements. The greatest of care and consideration should be used in selecting a site for the radio installation; especially in choosing a location for the system of antennas and associated transmission lines. Signals from Radio Transmitter Model 96D have greater range if the antenna is high and clear of buildings, cliffs, densely wooded areas, and other obstructions. Depressions, valleys, and other low places are poor places for radio transmission because the surrounding high terrain absorbs the r-f energy. Weak or otherwise undesirable signals may be expected if the transmitter is operated close to or under steel bridges, power lines, or power units. Choose, if possible, a location on a hilltop or elevation. Flat ground is desirable. Space for several antennas is needed. Normal transmission over water is better than over land. The drainage must be adequate to prevent flooding the interior of the shelter. If the equipment is part of a communication center, but is not installed within the center, locate the equipment nearby. In locating antennas, avoid obstructions which are two or three degrees or more above the horizontal plane of the antennas. This is approximately 200 to 300 feet at a distance of 1 mile from the antennas.

b. Interior Requirements. The shelter for the equipment must meet the following requirements:

(1) The floor must be capable of sustaining the weight of the equipment in a level position without vibration. Total weight of the equipment can be determined from the table below, which lists the weight of each unit:

<u>Unit</u>	<u>Weight</u> <u>(lbs)</u>
Radio Transmitter Model 96D	320
Rectifier Power Unit Model 36D	1895
Modulator Unit Type 50H	963

(2) Sufficient space must be available for possible repair work and for door swing as explained in subparagraph (4) below.

(3) The ceiling height must be at least 9 feet to allow for r-f transmission line installation.

(4) Sufficient space must be allowed behind the equipment to permit removal of the rear panels, and sufficient space must be allowed at one end of the installation so that it is possible to walk to the rear of the equipment. Figure 17 is a layout showing the floor space required when three Radio Transmitters Model 96D, one Rectifier Power Unit Model 36D, and one Modulator Type 50H are grouped together as an installation. Except for these limitations, the equipment may be located anywhere convenient to the transmission lines and external power source.

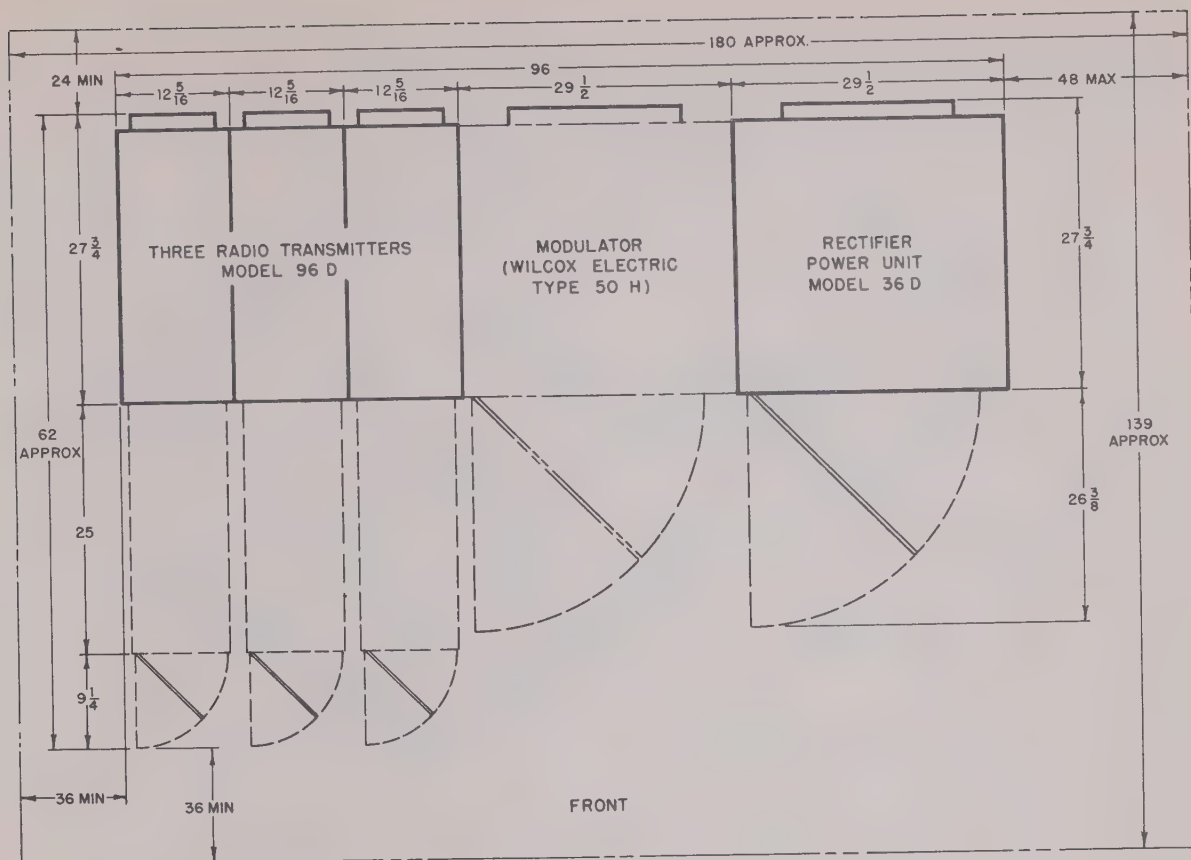


Figure 17. Floor space required for installation of three transmitters, one rectifier, and one modulator

(5) Adequate lighting for day and night operation must be provided. Position the equipment so that the panel designations and meters may be read easily by the operating personnel. Artificial lighting should be arranged so that the light falls directly upon the instruments and control panels. A portable drop lamp and extension cord are convenient assets for the operating and maintenance personnel.

13. Uncrating, Unpacking, and Checking

a. General. Equipment may be shipped in oversea packing cases or domestic packing cases (fig. 18). When new equipment is received, select a location where the equipment may be unpacked without exposure to the elements and

which is convenient to the permanent or semipermanent installation of the equipment. Because of the weight and size of the equipment, uncrate it in the room where it is to be installed.

Caution: Be careful in uncrating, unpacking, and handling the equipment; it is easily damaged. If it becomes damaged or exposed, a complete overhaul might be required or the equipment might be rendered useless.

b. Uncrating and Unpacking Boxes 2/3 and 3/3 Of Radio Transmitter Model 96D. (1) Remove steel straps from box,

(2) Use a nail puller to remove nails from lid.

(3) After removing lid, cut waterproof case-liner along three edges.

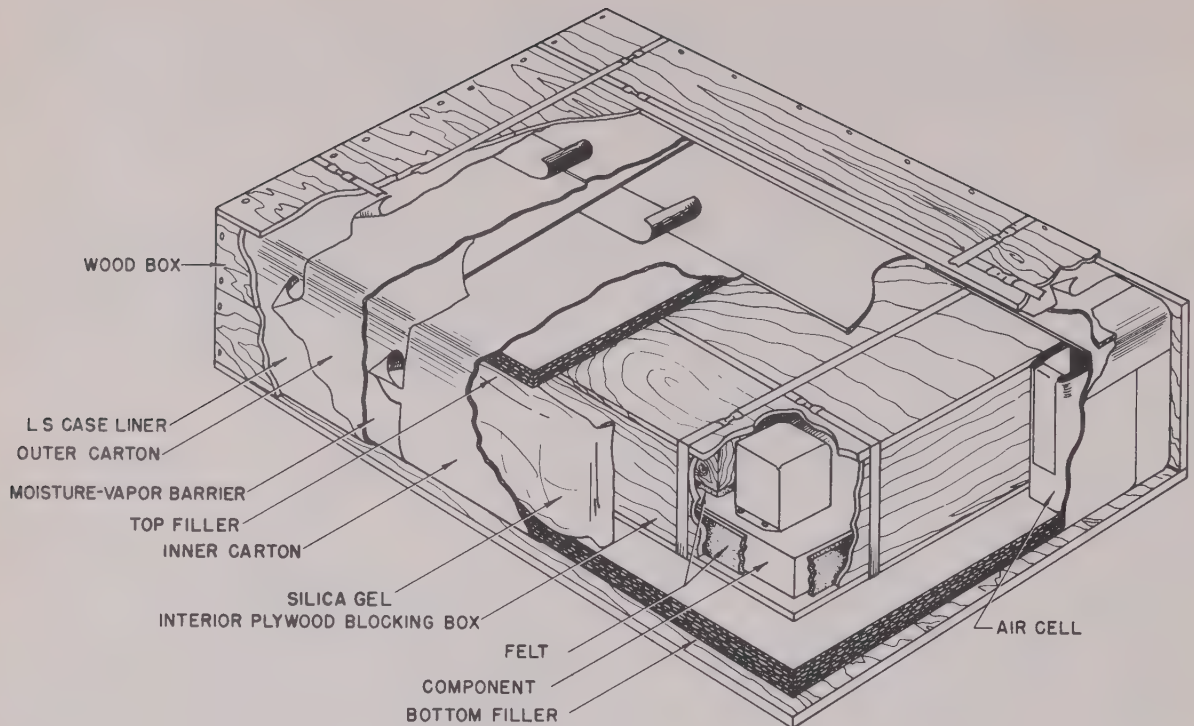


Figure 18. Typical component packed for export shipment.

(4) Open inner carton by cutting sealing tape.

(5) Open moistureproof-vaporproof barrier at end seals to permit reuse.

(6) Remove individual cartons.

(7) Open cartons and remove contents.

(8) Check contents of packing case against master packing slip.

(9) Inspect components for possible damage incurred during shipping.

c. Uncrating and Unpacking Box 1/3 of Radio Transmitter Model 96D.

(1) Set case with longest dimension on floor.

(2) Remove steel straps.

(3) Use nail puller to remove nails from lid.

(4) Remove lid and excelsior cushion from top, ends, and sides of box.

(5) Use hoist and sling, or grab, to lift out interior wooden box and set it with longest dimension on floor.

(6) Pull lower rows of nails from

sides and ends of box.

(7) Using a hoist or sling, lift off case.

(8) Remove waterproof barrier and outer cushioning shroud, being careful not to damage moistureproof-vaporproof barrier inside.

(9) Remove barrier by cutting along seals at one end and two sides and rolling back out of way.

(10) Remove inner cushioning shroud (next to cabinet).

(11) Cut and remove steel straps which hold cabinet to mounting base.

(12) Lift cabinet straight up to remove it from mounting base. Set upright in desired location.

(13) Remove all interior blocking, cushioning, and tie-ups.

d. Uncrating and Unpacking Boxes 2/4 and 3/4 of Rectifier Power Unit Model 36D. (1) Remove steel straps from case.

(2) Use a nail puller to remove nails from lid.

(3) Invert opened case without spilling contents and lift case vertically off inner case.

(4) Use a nail puller to remove nails from lid.

(5) Invert second case and lift case vertically off inner carton.

(6) Reposition inner carton right side up, cut tape seals at seams and flap joints, and open corrugated carton. Do not damage inner moistureproof-vapor-proof barrier.

(7) Cut barrier along end and two side seals and roll back out of way.

(8) Remove steel straps from interior blocking box.

(9) Using nail puller, remove top pad, sides, and end from box in this order.

(10) Remove bags of silica gel and lift component unit from box.

(11) Remove all blocking, tie-ups, and cushioning from unit.

Caution: The transformer in box 4/4 weighs approximately 1,200 pounds. Be careful in handling it and do not damage the insulator type terminals.

14. Mounting Transmitter and Rectifier Cabinets

a. General. Figure 19 gives the mounting and drilling dimensions for three transmitters, one rectifier, and one modulator. These dimensions may be readily extended to cover any number of units. The bolt holes for wood flooring or expansion bolts for concrete should be drilled before the cabinets are moved into place. If steel flooring is used, the holes should be drilled and tapped for 1/4"-20 machine screws.

b. Radio Transmitter Model 96D Cabinet. After drilling the holes in the floor, move the transmitter approximately in place and withdraw the slide. To remove the slide, turn the slide lock handle (fig. 3) a quarter turn to the left and pull the slide forward to the stops. In this position the transmitter will tip forward unless the slide is supported at the front. Remove the antenna leads (fig. 9) from the feed-

e. Uncrating and Unpacking Boxes 1/4 and 4/4 of Rectifier Power Unit Model 96D. Boxes 1/4 and 4/4 are to be unpacked following the same procedure as described in subparagraph c above for box 1/3.

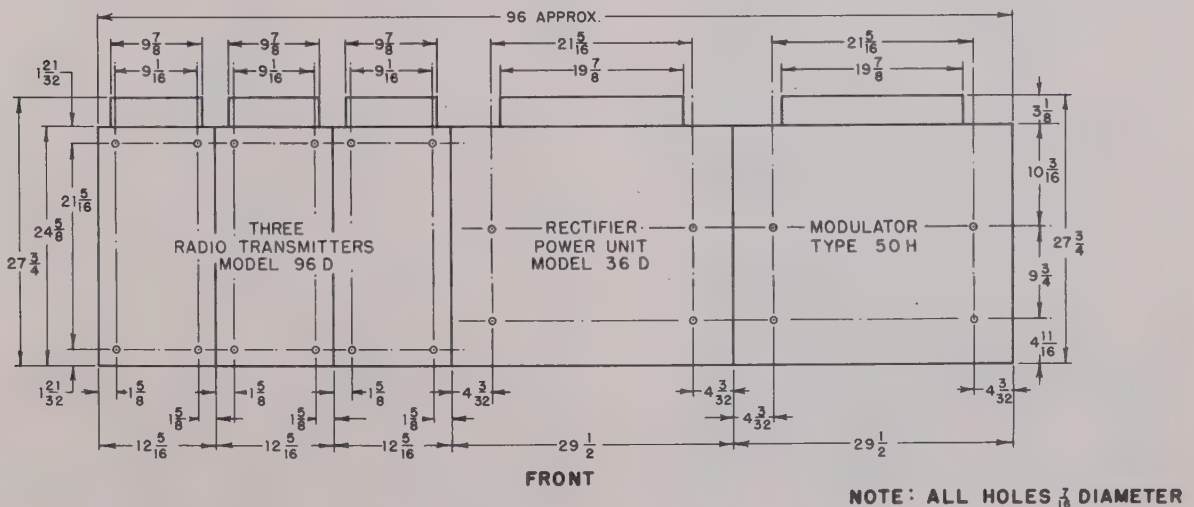


Figure 19. Mounting and drilling dimensions for an installation consisting of three transmitters, one rectifier, and one modulator

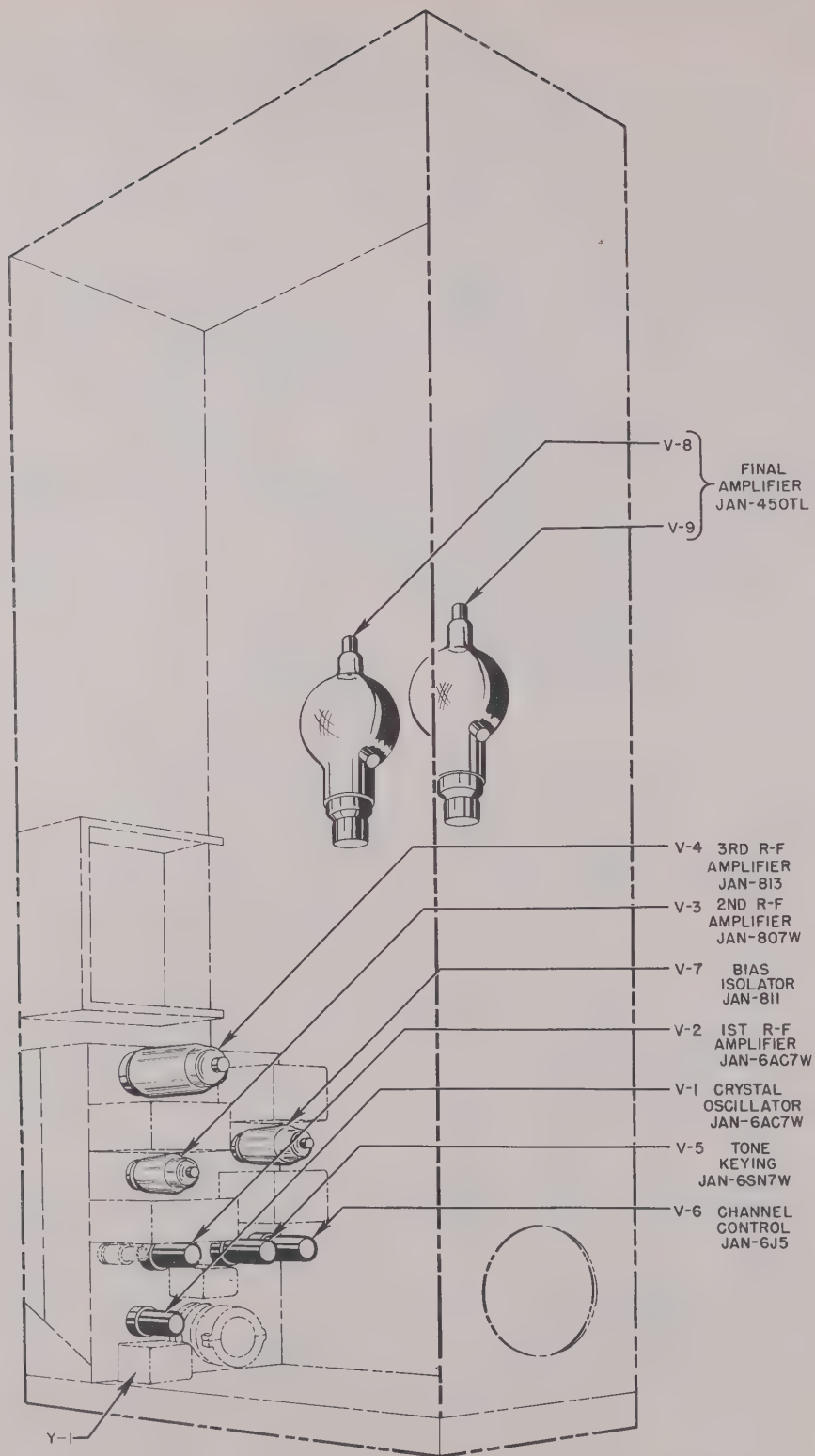


Figure 20. Radio Transmitter Model 96D, tube and crystal location diagram

through insulators at the top of the slide and the leads to the slide terminal board, E-7. Remove the slide and set it on the floor in front of the cabinet by disengaging the four catches at the front end of the slide supports. Lower the slide to the floor carefully to avoid damaging the equipment. It is not necessary to disconnect the leads to transmitter terminal board E-7 if the slide is turned to the left directly in front of the cabinet. Shift the cabinet to its exact location over the bolt holes and bolt it to the floor. Replace the slide in the cabinet. Reconnect the antenna leads and re-engage the catches on the slide supports. Push the slide into the cabinet and then pull it forward to check the action of the roller supports. The catches should stop the slide when the slide is pulled forward. An alternate method of securing the transmitter cabinet to the floor without removing the slide can be used if two or more men are available to steady and work the unit into position. Pull the slide out as far as it will go. One man must steady the unit. Remove the air cleaner from the rear of the cabinet, thus providing access to the interior. While one man keeps the transmitter from tipping, the other man at the rear of the unit installs the bolts which secure the cabinet to the floor.

c. Rectifier Power Unit Model 36D Cabinet. The front panel door and the back safety panel should be removed before mounting for convenience in locating the cabinet over the predrilled mounting holes. Move the cabinet over the mounting holes. Four screws which pass through the bottom shelf are used to fasten the cabinet to the floor.

15. Installation of Transmitter Components (fig. 6)

a. General. When the slide is pulled forward, all of the electronic components of the transmitter are easily reached from the right side of the slide.

b. Installation of Tubes and Crystal (fig. 20). Remove the tubes from their containers and check to see that all are in good physical condition. Select the crystal of the desired frequency. Pull the slide forward all the way to the end of its travel.

(1) Remove the cover over the crystal socket. Plug the crystal into the socket and replace the cover.

(2) The oscillator tube (V-1), Tube JAN-6AC7W, the first amplifier tube (V-2), Tube JAN-6AC7W, the second amplifier tube (V-3), Tube JAN-807W, the third amplifier tube (V-4), Tube JAN-813, the tone keying tube (V-5), Tube JAN-6SN7W, the channel control tube (V-6), Tube JAN-6J5, and the bias isolator tube (V-7), Tube JAN-811, are all mounted on the exciter unit. To insert the tubes, align the keys or guide pins of the tubes with the keyways or guides of the sockets. Push the tubes straight in until they are firmly seated in their sockets. Secure the tube clamps.

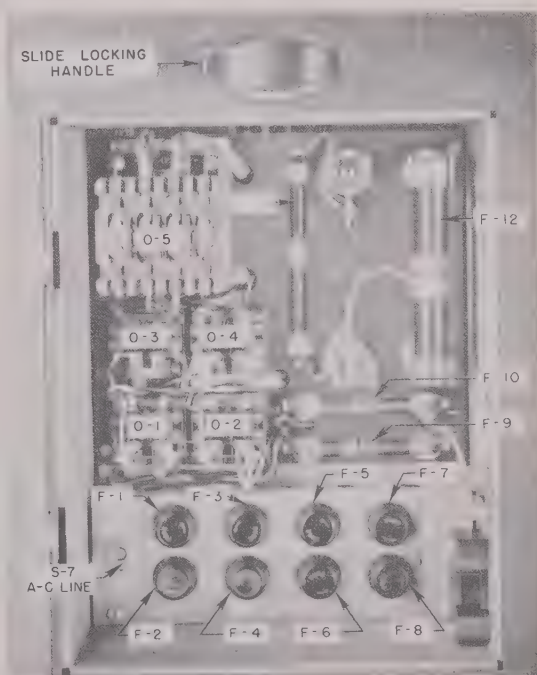


Figure 21. Radio Transmitter Model 96D, fuse panel

(3) Attach the plate leads of tubes V-3, V-4, and V-7 to the caps on the tubes. The plate lead for tube V-4 connects to coil L-5 mounted on the slide.

(4) To install the final amplifier tubes, V-8 and V-9 (two tubes JAN-450TL), insert the tube in the socket with the pin at the side of the tube base alined with the slot in the socket. Turn the tube clockwise to the stop. Attach the plate and grid connections as shown in figure 28.

c. Installation of Fuses (fig. 21). The fuses are mounted on the fuse and relay panel at the front of the slide. Access to the panel is obtained by opening the door protecting the panel. Eight fuses of the cartridge type are fitted in sockets across the bottom of the panel and held in place by caps with bayonet fittings. The other four fuses are the cartridge type and mount in clips on the panel. Insert the fuses in their respective places, following the listing below:

Ref symbol	Circuit identification	Type	Rating
F-1, F-2	Filament transformer T-3.	Cartridge.	1 amp, 250 v.
F-3, F-4	Filament transformer T-2.	Cartridge.	1 amp, 250 v.
F-5, F-6	Filament transformer T-4.	Cartridge. (slow-blow).	2 amp, 250 v.
F-7, F-8	Blower motor B-1.	Cartridge. (slow-blow).	2.5 amp, 250 v.
F-9	R-f bias supply.	Cartridge.	0.5 amp, 1,000 v.
F-10	Low-voltage plate supply.	Cartridge.	0.5 amp, 1,000 v.
F-11	Plate voltage supply V-4.	Cartridge.	0.75 amp, 2,500 v.
F-12	High-voltage plate supply.	Cartridge.	1.5 amp, 5,000 v.

Note. Do not put a fuse into the clips marked F-12 TUNE ONLY.

d. Installation of Coils, Chokes, Capacitors, and L-Shaped Jumper. Certain coils, chokes, and an L-shaped jumper are installed in fuse clips mounted on the slide. Since the frequency at which the transmitter is to operate determines what coils and chokes are to be used, the arrangement of capacitors C-37 and C-38 and the jumper, instructions for the installation of these components is given in paragraph 31. Capacitors C-35, C-36, and C-39 are installed (fig. 28) as follows:

(1) Capacitor C-35 is mounted on two stand-off insulators by means of two bolts. These bolts are provided and

will be found in a small cloth bag tied to one of the insulators. Electrical connection to the capacitor is completed by two strap leads used to connect the plate of V-8 and V-9 to C-35.

(2) Capacitor C-36 is mounted on the slide by means of two u-shaped brackets. A bracket is placed at each end of the capacitor and is fastened to the slide. Tighten the bolts after carefully alining (par. 82b) the capacitor shaft with the dial shaft and making the mechanical connection at the insulator connector.

(3) Capacitor C-39 is mounted on four insulators at the extreme top of the slide. Before placing the capacitor in position make sure that the electrical connections are in place. Mount the

capacitor but before tightening the bolts carefully align (par. 82a) the capacitor drive shaft with the dial drive shaft and make the mechanical connection at the insulator connector.

16. Installation of Rectifier Components (fig. 12)

a. General. To install the components of the rectifier in the rectifier cabinet, remove the front door and the back panel in order to provide access to the interior of the cabinet. To install the high-voltage transformer, remove the access door at the lower right side of the cabinet.

b. Installation of High-Voltage Power Transformer (fig. 12). The h-v power transformer is mounted in the base of the rectifier cabinet. Install the transformer as follows:

(1) Remove the 12 sheet metal screws holding the access panel at the lower right side of the rectifier unit. Set the panel to one side.

(2) Move the transformer into the cabinet from the right side of the cabinet through the access door provided. Slide the transformer in between the guide channels as far as it will go. Terminals face rear in system (fig. 94); front face in system (fig. 92).

Caution: Use extreme care in handling the unit. It is very heavy (1,200 pounds) and, if allowed to slip or fall, may cause injury to personnel or damage to the equipment.

(3) Make connections to the terminals at the rear of the transformer as shown in figure 22. (Different method in fig. 92).

c. Installation of High-Voltage Rectifier Assembly (fig. 12). The h-v rectifier assembly (fig. 14) is mounted on the top shelf of the cabinet. Install the h-v rectifier assembly as follows:

(1) Place the h-v rectifier assembly on the top shelf, about three-fourths of the way in, with the tube sockets toward the front and the connector jack (J-2) at the right rear of the cabinet.

(2) Connect the leads from the high-voltage transformer and the high-voltage terminals to the terminals on the components within the rectifier chassis, as shown in figure 22. These leads come up through the shelf from the bottom to the under side of the rectifier assembly.

(3) Locate the h-v rectifier assembly so that the four nuts in the bottom flange line up with the four holes in the shelf.

(4) Insert four screws through the shelf from the bottom into the nuts in the flange on the chassis. Tighten the screws securely.

(5) Insert the plug (P-2) into the jack (J-2) so that the key and the keyway line up. Screw the rotating collar on the plug down onto the jack as far as it will go.

d. Installation of Low-Voltage Rectifier Assembly (fig. 12). The l-v rectifier (fig. 13) is mounted on the second shelf from the top of the cabinet behind the control, fuse, and relay panels. Install the l-v rectifier assembly as follows:

(1) Place the l-v rectifier assembly on the second shelf so that the three tubes are toward the rear of the cabinet.

(2) Line up the four nuts in the bottom of the l-v rectifier assembly with the four holes in the shelf.

(3) Insert four screws from below the shelf through the shelf into the nuts on the chassis. Tighten the screws securely.

(4) Insert the plug (P-1) into the jack (J-1) so that the key and keyway line up. Screw the rotating collar on the plug to the jack and tighten securely.

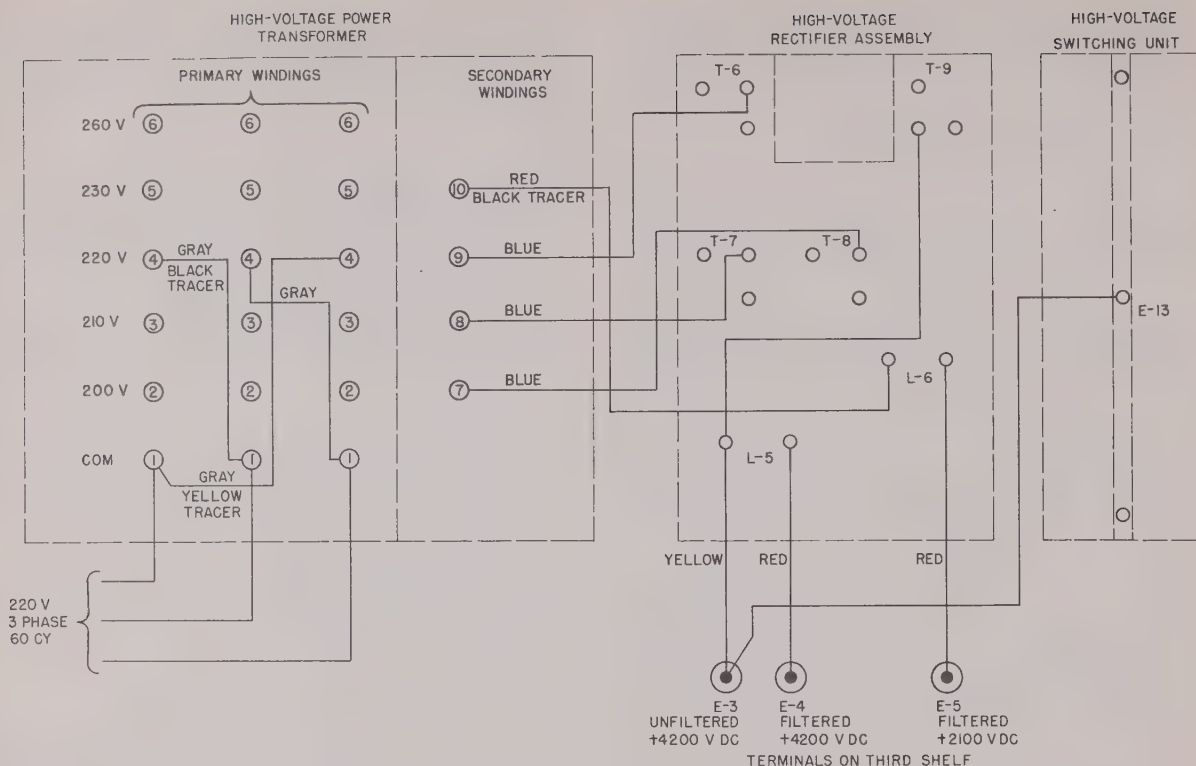


Figure 22. Connections between high-voltage transformer, high-voltage rectifier, and switching unit. (Applicable to rectifier system shown in Figure 94).

e. Installation of Tubes (fig. 23). Remove the tubes from their containers and check to see that all are in good physical condition. The rectifier requires nine tubes, six rectifier Tubes JAN-4B32, two rectifier Tubes JAN-3B28, and a rectifier Tube JAN-5U4G. Install the tubes as follows:

(1) The high-voltage rectifier assembly requires six Tubes JAN-4B32. These tubes are installed from the front of the unit. Install the rear tubes first and make the plate cap connections as each tube is installed. Aline the pins on the tube with the slot in the tube socket. Push the tube in as far as it will go; then make a slight turn in a clockwise direction to lock the tube in the socket.

(2) Install all six tubes and be sure the connections to the caps are made securely. The wire which comes up through the chassis at the rear of the

tube is the plate lead for that tube.

(3) The tubes in the low-voltage rectifier are installed from the rear of the cabinet. Two Tubes JAN-3B28 and one Tube JAN-5U4G are required. Tube JAN-5U4G is installed in the socket nearest jack J-1. Aline the key on the tube base with the keyway in the socket and push the tube into the socket until the tube base is flush with the top surface of the socket. Snap the tube lock to hold the tube firmly in the socket.

(4) The two Tubes JAN-3B28 are installed in the sockets marked V-2 and V-3. Aline the pins on the tube base with the slots in the socket and push the tube into the socket as far as it will go; then turn slightly clockwise to hold the tubes in the sockets. Make the connection to the plate caps with the two leads that come through the chassis between the tube sockets.

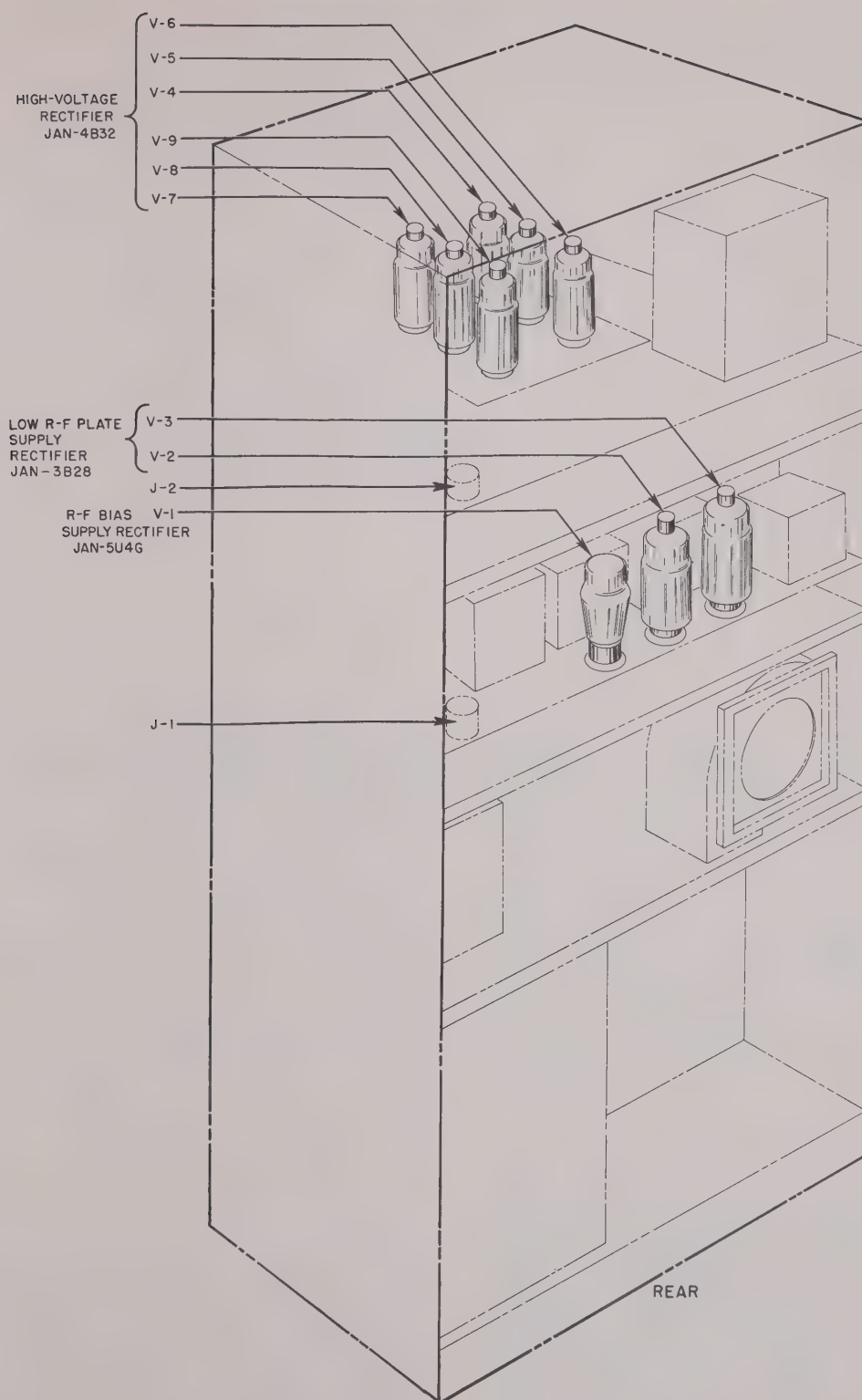


Figure 23. Rectifier Power Unit Model 36D, tube location diagram

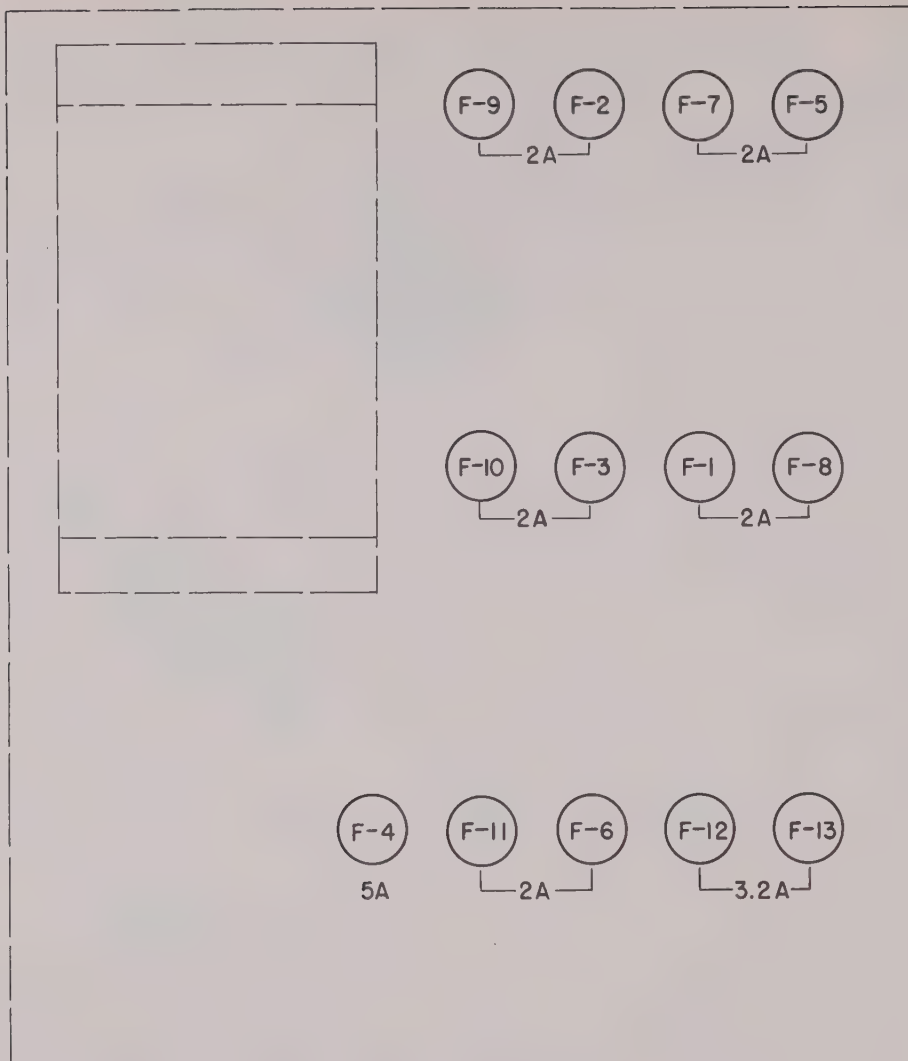


Figure 24. Rectifier Power Unit Model 36D, fuse panel

f. Installation of Fuses (fig. 24). The rectifier requires 14 fuses. All of the fuses are of the cartridge type. Thirteen fuses are located on the fuse panel, which is between the second and third shelves (fig. 4) just to the right of the control panel. Access to this fuse panel is obtained by opening the door at the front of the cabinet. The fuses on the fuse panel fit into sockets and are held

in place by caps. The fourteenth fuse is mounted above the high-voltage transformer in fuse clips mounted on insulators. The location of this fuse is shown in figure 12. All fuse sockets are identified by the circuit identification, reference symbol, and rating. Insert the proper fuses in their respective places, following the listing on page 27:

Ref symbol	Circuit identification	Rating
F-1, F-8	Low-voltage rectifier filament transformer T-3.	1 amp, 250 v.
F-2, F-9	R-f bias power supply transformer T-2.	2 amp, 250 v (slow-blow).
F-3, F-10	Low-voltage power supply transformer T-4.	2.5 amp, 250 v (slow-blow).
F-4	12-volt d-c supply.	5 amp, 250 v.
F-5, F-7	High-voltage rectifier filament transformers T-6, T-7, T-8, and T-9.	2 amp, 250 v (slow-blow).
F-6, F-11	12-volt supply power transformer T-1.	2 amp, 250 v (slow-blow).
F-12, F-13	Blower B-1.	2.5 amp, 250 v (slow-blow).
F-14	$\pm 2,000$ -volt supply	1 amp, 2,500 v.

g. Installation of Vacuum Switches 0-8 Through 0-12 and Resistor R-5.

(1) Carefully insert each of the glass-inclosed vacuum switches, 0-8 through 0-12, into position through the coil into the clips below the high-voltage switching unit chassis (fig 65). The long leg with the round straight cylinder inside goes through the coil. Press the other pin terminal carefully into the spring clip mounted at the side of each coil. Place the high-voltage connector, on the nearest lead, over the terminal on the short leg of the switch.

(2) Insert resistor R-5 (5 megohms) into its fuse type clips (fig. 12).

17. Connections between Units

a. An interconnection diagram is shown in figure 93. This diagram indicates a representative installation consisting of three transmitter units, two rectifier power units, one modulator unit, two wall boxes, and two switches.

The installation shown is typical but not necessarily standard. For example, figures 93 and 94 show Rectifier connections made through plugs P-4, P-5 and jacks J-4, J-5. In many cases, plug and jack connections are not desired, in which case Rectifier connections are made directly to terminal boards E-6 and E-14 as shown in figure 92. Plugs P-4, P-5 and jacks J-4, J-5 are optional items, supplied only when equipment is ordered accordingly. The wall boxes shown in figure 93 are also optional items.

b. To provide a coding system for tracing the interconnections, each successive terminal starting at the top of the first transmitter unit (left-hand side of illustration) has been accorded a successive arbitrary number, successive numbers being assigned to each terminal of the second and third transmitter units, the rectifier power units and the modulator. These numbers appear only on the interconnection diagram and on the wire cutting list (app II). These num-

bers are purely arbitrary and bear no relation to terminal board markings. Actual terminal board markings are also shown on the interconnection diagram to facilitate interpretation of the system wiring.

c. The point of origin and the destination, based on these arbitrary markings, (10 - 96) then becomes the identifying number of any given interconnecting wire, and this full identification is shown at each end of the wire. This number identifies the wire in the wire cutting list shown in appendix II. This list shows the color, wire-size, insulation, length, and terminal fittings of each wire.

d. All wires should be cut to the lengths indicated, and may be lugged at one end prior to the starting of the actual interwiring. The wires are then cut to precise length and fitted with the second lug after the wire has been run to its destination.

e. Do not attempt to run any specific group of wires, such as power wires, interlock wires, etc. Start at one end of the installation, or, at the rectifier power unit and connect to that unit each of the wires designated on the wiring diagram.

f. Run the wires (lacing is unnecessary) through the ducts provided at the bottom rear of each successive unit, making such connections as are required, and adding to them any new wires required for interlocks, modulator, etc. Complete all the connections to each unit before going on to the next. Check and recheck to be certain that the wire size, type, length, and color is as indicated in the wire cutting table.

g. See that the shield of all shielded leads is grounded at least at one end of the lead and that the shield does not touch any terminal other than ground. Check also to be sure that terminal lugs do not touch adjacent terminals.

h. Additional transmitter units may

be connected merely by following the sequence of the connections used for the transmitters shown in the interconnection diagrams. The same applies to connection of an additional modulator. In this event, the second modulator is connected to the second rectifier-power unit. The drawing shown, however, is typical only for the exact equipment complement shown. In any case, only the connections relating to the interlock, modulator underload, modulator release, and 4,200-volt supply circuits, and connections to the 3-phase power terminals on the rectifier power unit, will change. The interlock circuit terminal, 8, of the last unit of a bank of transmitters is returned to the nearest rectifier power unit top interlock terminal.

18. Service Upon Receipt of Used or Reconditioned Equipment

a. Follow the instructions in paragraph 13 for uncrating, unpacking, and checking the equipment.

b. Check the used or reconditioned equipment for tags or other indications pertaining to changes in the wiring of the equipment. If any changes in wiring have been made, note them in this manual, preferably on the schematic diagram.

c. Check the operation controls for ease of rotation. If lubrication is required, refer to the lubrication instructions in chapter 3, section III.

d. Perform the installation and connection procedures given in paragraphs 14 through 17.

SECTION II. CONTROLS AND INSTRUMENTS

19. Transmitter Controls and Instruments and their Use (figs. 25 and 27)

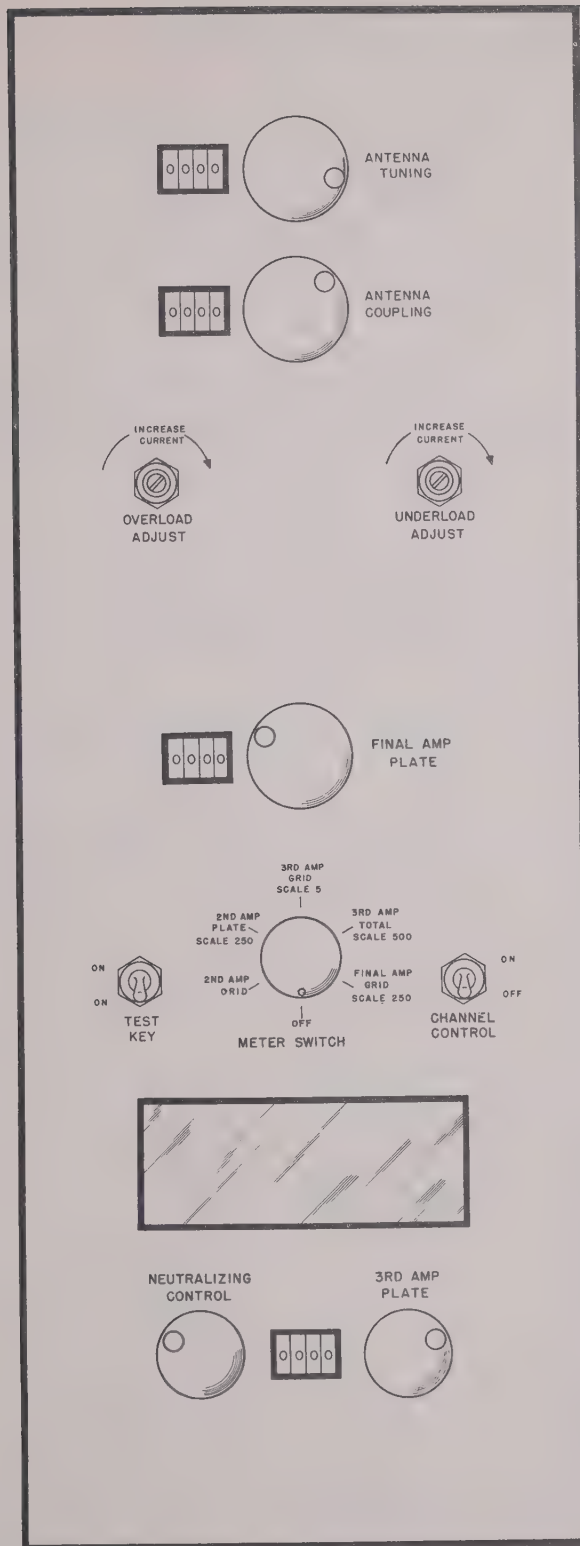


Figure 25. Radio Transmitter Model 96D,
diagram of control panel

a. The following table lists the controls on the transmitter and their functions:

Control	Function														
ANTENNA TUNING (C-39)	Used to tune the antenna coupling system to the output frequency of the transmitter.														
ANTENNA COUPLING	Used to adjust the coupling between the final amplifier and the antenna transmission line.														
FINAL AMP PLATE (C-36)	Tunes the final amplifier plate circuit to the desired frequency.														
NEUTRALIZING CONTROL (C-27)	Controls the amount of r-f energy fed back to the input circuit of the final amplifier to overcome the effect caused by the grid-to-plate capacity of final amplifier tubes V-8 and V-9.														
3RD AMP PLATE (C-26)	Tunes the third amplifier plate circuit to the desired frequency.														
OVERLOAD ADJUST (R-42)	Determines the amount of final amplifier total current that will cause the overload relay to operate.														
UNDERLOAD ADJUST (R-43)	Determines the amount of final amplifier total current that will cause the underload relay to operate.														
CHANNEL CONTROL (S-6)	Causes the channel operate relay to close. This supplies power to the filament transformers and bias and plate voltages to the tubes. Thus the transmitter is ready for operation. Used during the tune-up procedure.														
TEST KEY (S-5)	When the CHANNEL CONTROL switch is closed, the setting of the TEST KEY in either of the ON positions causes the transmitter to operate. The TEST KEY is used during tune-up and starting procedures.														
METER SWITCH (S-4)	Is a six-position, two-pole wafer switch used to connect ammeter M-2 into the various circuits as given below: <table> <tr> <th>Position</th><th>Function</th></tr> <tr> <td>2ND AMP GRID</td><td>Connects M-2 into the second amplifier grid circuit.</td></tr> <tr> <td>2ND AMP PLATE</td><td>Connects M-2 into the second amplifier plate circuit.</td></tr> <tr> <td>3RD AMP GRID</td><td>Connects M-2 into the third amplifier grid circuit.</td></tr> <tr> <td>3RD AMP TOTAL</td><td>Connects M-2 into the third amplifier cathode circuit.</td></tr> <tr> <td>FINAL AMP GRID</td><td>Connects M-2 into the grid circuit of the final amplifier.</td></tr> <tr> <td>OFF</td><td>Disconnects meter M-2 from all circuits.</td></tr> </table>	Position	Function	2ND AMP GRID	Connects M-2 into the second amplifier grid circuit.	2ND AMP PLATE	Connects M-2 into the second amplifier plate circuit.	3RD AMP GRID	Connects M-2 into the third amplifier grid circuit.	3RD AMP TOTAL	Connects M-2 into the third amplifier cathode circuit.	FINAL AMP GRID	Connects M-2 into the grid circuit of the final amplifier.	OFF	Disconnects meter M-2 from all circuits.
Position	Function														
2ND AMP GRID	Connects M-2 into the second amplifier grid circuit.														
2ND AMP PLATE	Connects M-2 into the second amplifier plate circuit.														
3RD AMP GRID	Connects M-2 into the third amplifier grid circuit.														
3RD AMP TOTAL	Connects M-2 into the third amplifier cathode circuit.														
FINAL AMP GRID	Connects M-2 into the grid circuit of the final amplifier.														
OFF	Disconnects meter M-2 from all circuits.														
1ST AMP PLATE BAND SWITCH (S-2)	A four position switch which changes the tuning range of the 1ST AMP PLATE TUNING control.														
1ST AMP PLATE TUNING Control (C-7)	Tunes the first amplifier plate circuit to the desired frequency of operation.														

Control	Function
2ND AMP PLATE BAND SWITCH (S-3)	A four position switch which changes the tuning range of the 2ND AMP PLATE TUNING control.
2ND AMP PLATE TUNING control (C-14)	Tunes the second amplifier plate circuit to the desired frequency of operation.
EXCITATION SWITCH (S-1)	In the INTERNAL position, the transmitter is excited by its own oscillator. In the EXTERNAL position, the transmitter can be excited by an external source.
EXCITATION ADJUST (R-17)	A potentiometer which is used to adjust the drive on the final amplifier.
KEYING BIAS ADJUST control (R-30)	A potentiometer to adjust the bias so that extraneous signals do not key the transmitter.
TONE KEYING GAIN control (R-24)	A potentiometer used to adjust the level of the external keying signal to equal the level of the internal keying signal.

b. The following table lists the transmitter instruments and their use:

Instrument	Function
Final amplifier plate ammeter (M-1)	Indicates the total final amplifier current.
Multiscale ammeter (M-2)	Indicates the current in five different circuits in the transmitter (subpar. a above).

20. Rectifier Controls and Instruments and their Use (Fig. 26)

a. The following table lists the controls on the rectifier and their functions:

Control	Function								
START STOP switch (S-7)	Used to stop and start the rectifier at the rectifier.								
HIGH VOLTAGE switch (S-5)	In the ON position, the high-voltage primary contactor relay can operate and apply power to the high-voltage rectifier. This makes available the 4,200-volt and 2,100-volt d-c power.								
LOW VOLTAGE switch (S-6)	Setting this switch to OFF breaks the interlock circuit and causes the interlock relay to open. This removes power from the high- and low-voltage rectifiers.								
LINE VOLTAGE switch (S-1)	A three-position, two-pole rotary switch which connects the line voltage meter to the a-c power lines by phases as listed below: <table> <tr> <th>Position</th><th>Function</th></tr> <tr> <td>1-2</td><td>Connects meter M-1 across phases 1 and 2 of the input power line.</td></tr> <tr> <td>1-3</td><td>Connects meter M-1 across phases 1 and 3 of the a-c power line.</td></tr> <tr> <td>2-3</td><td>Connects meter M-1 across phases 2 and 3 of the a-c power line.</td></tr> </table>	Position	Function	1-2	Connects meter M-1 across phases 1 and 2 of the input power line.	1-3	Connects meter M-1 across phases 1 and 3 of the a-c power line.	2-3	Connects meter M-1 across phases 2 and 3 of the a-c power line.
Position	Function								
1-2	Connects meter M-1 across phases 1 and 2 of the input power line.								
1-3	Connects meter M-1 across phases 1 and 3 of the a-c power line.								
2-3	Connects meter M-1 across phases 2 and 3 of the a-c power line.								

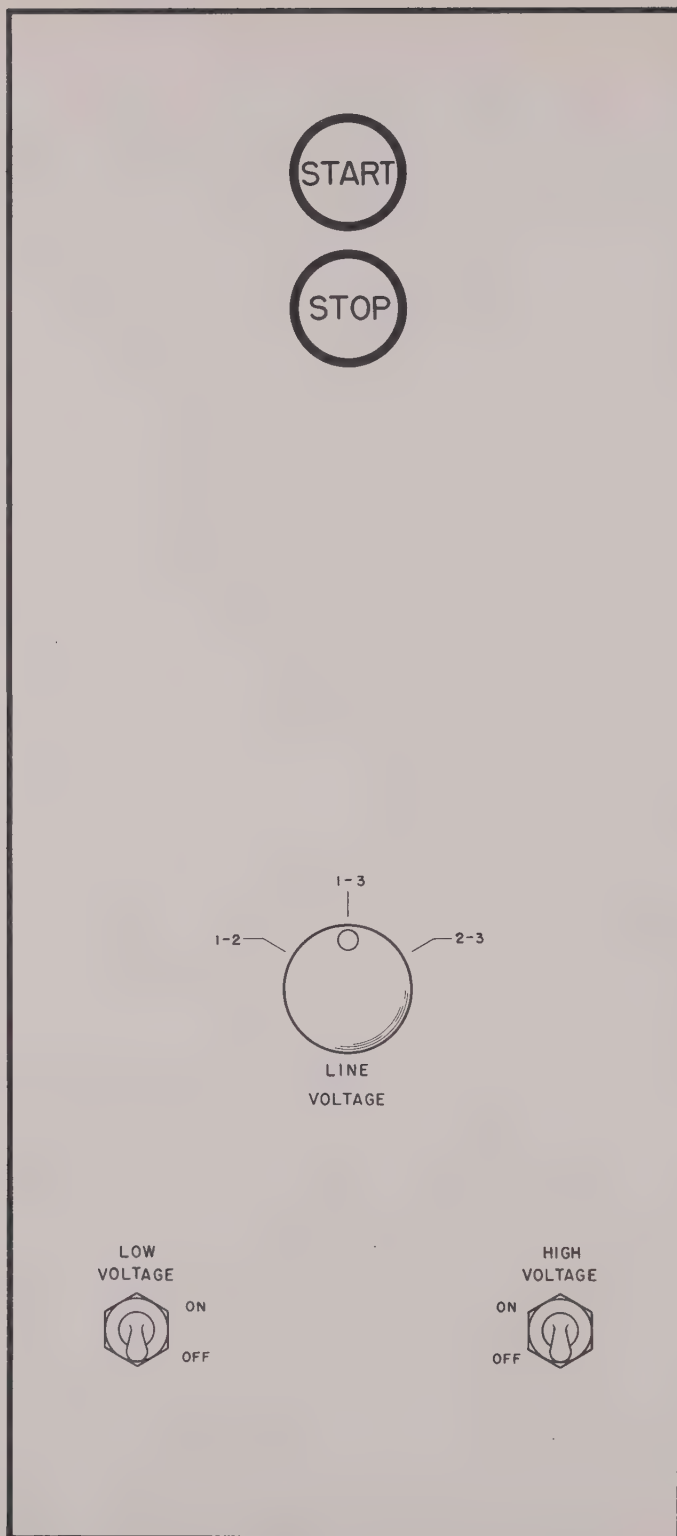


Figure 26. Rectifier Power Unit Model 36D, diagram of control panel

b. The following table lists the instruments on the rectifier and their use:

Instrument	Function
AC LINE (M-1)	Indicates the voltage across the various phases of the a-c power line, depending upon the position of LINE VOLTAGE switch S-1 as shown above.
RF BIAS (M-2)	Indicates output voltage of the bias supply rectifier.
LOW RF PLATE (M-3)	Indicates output voltage of the low-voltage plate supply rectifier.
FINAL PLATE (M-4)	Indicates output voltage of the high-voltage plate supply rectifier.

SECTION III. OPERATION UNDER USUAL CONDITIONS

21. Starting Procedure for Rectifier Power Unit Model 36D.

Note. If, during the starting procedure, an abnormal result is obtained, see paragraph 50, equipment performance checklist. Before using this starting procedure, check paragraph 30 for initial adjustments.

a. Set the HIGH VOLTAGE switch (S-5) to OFF.

b. Set the LOW VOLTAGE switch (S-6) to OFF.

c. Close the main three-phase, a-c power line switch.

d. Set the circuit breaker, K-1, to ON.

e. Rotate the LINE VOLTAGE switch through each of its three positions and note the reading on the AC LINE meter, M-1. The reading should be approximately 220 volts in each position.

f. Press the START button START-STOP switch S-7 and hold in until the start-stop relay closes; then release the START button. As soon as the tubes on the low-voltage rectifier chassis are

warmed up, the RF BIAS meter, M-2, will indicate approximately -450 volts. Approximately 30 seconds after the START button has been pushed, the time-delay relay, K-2, will close.

g. Set the LOW VOLTAGE switch to ON. The interlock relay, 0-1, will be energized and the LOW RF PLATE meter, M-3, will indicate approximately 525 volts.

Note. All the external and internal interlocks in the interlock circuit must be closed before the interlock relay will close.

h. Set the HIGH VOLTAGE switch to ON. The high-voltage primary contactor, K-3, will close and the FINAL PLATE meter, M-4, will indicate approximately 4,200 volts.

Warning: The -450-volt bias supply is not removed by the opening of any interlock switch.

22. Starting Procedure for Radio Transmitter Model 96D.

Note. If, during the starting procedure, an abnormal result is obtained, see paragraph 50, equipment performance checklist. Before using this starting procedure, check paragraphs 31 and 32 for initial adjustments and

tuning.

a. Pull out the high-voltage switch handle, S-12 (fig. 3).

b. Set the TEST KEY switch, S-5, to the center position.

c. Set the CHANNEL CONTROL switch, S-6 to OFF.

d. Set the METER SWITCH, S-4, to OFF.

e. Close the three-phase, a-c power line switch.

f. Open the door covering the fuse and relay panel and set the a-c line switch, S-7, to ON. Close the fuse and relay panel door securely to engage the interlock properly. Allow about 30 seconds for tubes V-1, V-2, V-3, V-5, V-6, and V-7 to warm up to their operating temperature.

g. Push in the high-voltage switch, S-12.

h. If Rectifier Power Unit Model 36D, has not been turned on, start it by following the starting procedure described in paragraph 21.

i. Set the CHANNEL CONTROL switch (S-6) to ON. The blower motor, B-1, will operate, and the final amplifier tubes will light up, as can be seen through the window in the control panel.

j. Check the settings of the 3RD AMP PLATE, FINAL AMP PLATE, and ANTENNA TUNING controls against figures 78 through 88.

k. Set the TEST KEY to ON and note the reading on the final amplifier plate meter. It should be approximately 0.925 ampere.

23. Starting Rectifier and Transmitter from a Remote Station

a. The rectifier and transmitter units are usually part of a large fixed installation which may include two or more transmitters. The units are controlled by a remote control unit such as Remote Control Console Model CS-212.

b. Once the rectifier has been put into operation, the LOW VOLTAGE and the HIGH VOLTAGE switches are left in their ON positions, and the a-c power wall mounted switch is kept closed. The START switch on the remote control console is connected in parallel with the START switch on the rectifier. Once the transmitter has been put into operation, the a-c switch, S-7, is left in the ON position, and the CHANNEL CONTROL and TEST KEY switches are left in the OFF positions. A-c power for the transmitter is taken from the main terminal board of the rectifier. Closing the START switch on the remote control console is the same as pushing the START button on the rectifier. Therefore, the sequence of operation that follows will be the same as that described in paragraph 21f after the operation of the START button on the rectifier unit. The operation of the rectifier unit will apply high voltage to the transmitters. The operator can then, by means of the remote control equipment, key any one of the transmitters.

24. Types of Operation

The transmitter is designed for the following types of operation: c-w, mcw, voice-modulated, or carrier-shift teletypewriter. The EXCITATION SWITCH determines whether the transmitter is excited internally or externally. When the EXCITATION SWITCH is in the INTERNAL position, the transmitter is excited by the oscillator stage in the transmitter, and the output of the transmitter can be used for c-w, mcw, or voice-modulated transmission. When the EXCITATION SWITCH is in the EXTERNAL position, the transmitter is excited from an external exciter such as a variable frequency exciter or a

carrier-shift (teletypewriter) source of excitation. The output of the external exciter is applied to jack J-4 or J-5 on the transmitter unit. These adjustments of the EXCITATION SWITCH are made at the same time the initial adjustments are made.

25. Stopping Procedure for Rectifier and Transmitter

a. Stopping Procedure from Remote Control Station. When the operator at the remote control station is instructed to stop the equipment, he moves the STOP-START switch to the STOP position. The start-stop relay in the rectifier opens, and thus power is removed from the entire rectifier unit except the 12-volt rectifier. All the transmitters and the modulator, the power to which is furnished by the rectifier, will also become inoperative.

b. Local Stopping Procedure for Transmitter. When it is necessary to stop only one of several transmitters, pull out the high-voltage switch, S-12, at the bottom front of the transmitter. Open the door protecting the fuse and relay panel, and move a-c switch S-7 to the OFF position. The transmitter is completely inoperative, but the other

transmitters, the rectifier, and the modulator are operative.

c. Local Stopping Procedure for Rectifier. To stop the rectifier, push in the STOP button and hold it in until the start-stop relay opens. The blower will stop operating and the tube filaments will be turned off. All the associated transmitters and the modulator will become inoperative, but the equipment will be ready for starting either from the remote control console or locally. The 12-volt rectifier in the rectifier power unit is still operating. If it is necessary to shut down the rectifier completely, set the circuit breaker, K-1, to OFF. Then open the main three-phase a-c power switch. The rectifier, transmitters, and modulator are now all completely shut down with no circuits energized.

SECTION IV. OPERATION UNDER UNUSUAL CONDITIONS

26. General

Radio Transmitter Model 96D and Rectifier Power Unit Model 36D are designed to operate under the conditions listed in the table below:

Temperature		Humidity	Altitude	
Maximum	Minimum		Maximum	Minimum
+75° C (+167° F)	-55° C (-67° F)	100% with condensation	10,000 ft	Sea level

However, the operation of the equipment may be difficult in regions where extreme cold, heat, humidity and moisture, sand conditions, etc., prevail. In the following paragraphs, instructions are given on procedures for minimizing the effects of these unusual operating conditions.

27. Operation in Arctic Climates

Subzero temperature and climatic conditions associated with cold weather affect the efficient operation of the equipment. Instructions and precautions for operation under such adverse conditions follow:

- a. Handle the equipment carefully.
- b. Locate the equipment inside a heat-

ed inclosure, where there is no danger of a cold draft striking the glass tubes when a door is opened. A sudden draft of cold air is often sufficient to shatter the glass envelope of a heated tube. If the inclosure is so constructed that this precaution is impossible, place a blanket or some other barrier between the source of the draft and the equipment.

c. When equipment which has been exposed to the cold is brought into a warm room, it will start to sweat and will continue to do so until it reaches room temperature. When the equipment has reached room temperature, dry it thoroughly. This condition also arises when equipment warms up during the day after exposure during a cold night.

28. Operation in Tropical Climates

When operated in tropical climates, radio equipment may be installed in huts where the ventilation is very poor. The high relative humidity causes condensation of moisture on the equipment whenever the temperature of the equipment becomes lower than the ambient air. To minimize this action, place any means of heating near the equipment, such as large electric bulbs.

29. Operation in Desert Climates

a. The main problem which arises with equipment operation in desert areas is the large amount of sand or dust which enters the moving parts of radio equipment. The ideal preventive measure is to house the equipment in a dustproof shelter. Since, however, such a building is seldom available and would require air conditioning, the next best precaution is to make the building in which the equipment is located as dustproof as possible with available materials. Hang wet sacking over the windows and doors, and cover the inside walls with heavy paper.

b. Be careful to keep the equipment as free from dust as possible. Make frequent preventive maintenance checks,

SECTION V. ADJUSTMENT OF EQUIPMENT

- NOTE -

The following instructions, paragraphs a through c, apply only when Wilcox transformer No. 43023 is supplied as a part of Rectifier Power Unit Model 36D. This transformer is shown in figure 92, symbol T-5.

a. In many parts of the world the prevailing 3 phase power source is 380 to 415 volts, 50-60 cycle, utilizing a neutral wire to obtain 220-240 volts single phase from the same source. By a modification of wiring, and the addition of a terminal strip (E15, schematic diagram (fig. 92), through which all the single phase circuits are routed, it is possible by appropriate strapping of E15, to operate the unit from the above power source, as well as 220-240 volt 3 phase power.

b. The schematic diagram (fig. 92) shows the "normal" or 220 volt connection in dotted lines as a part of the circuit, while the separate diagram at the right shows proper connections for 380-415 volt, 4 wire system. A separate terminal at bottom of the power terminal board E6 is provided for connection of the neutral wire. This terminal is designated N and becomes a part of the primary circuit when strapping is completed for 380 volt operation. The sectional diagrams at the side of figure 92 show transformer (T5) connections and modulator supply connection for both power sources.

c. Transformer T5, (fig. 92), Wilcox part number 43023, has all primary connections brought out to a terminal board which is accessible from the front of the cabinet, by removing the access panel at the lower front. It is possible to connect the primary in either "delta" or "star" as required, by means of

jumper which are a part of the primary cable. When the 380 volt connection is used, the primary voltmeter M1, is only required to measure the voltage from each phase to neutral, so that its scale of 300 volts is not exceeded.

30. Initial Adjustment of Rectifier Power Unit Model 36D.

a. Transformer Tap Adjustments. When the a-c line voltage differs appreciably from its normal value of 220 volts, it is necessary to change the connections on the transformers to insure correct output from the transformers. All the transformers, except T-1, the 12-volt power transformer, have taps on the primary winding. The 12-volt power transformer has taps on both the primary and secondary windings. To make these adjustments proceed as follows:

(1) High-voltage transformer T-5. The high-voltage transformer (fig. 22) has taps brought out to the rear of the case. These taps are labeled 1, 2, 3, 4, 5, and 6 to provide connections so that the equipment can be operated with a-c line voltages of 200, 210, 220, 230, or 240 volts.

(2) Transformers T-2, T-3, T-4, T-6, T-7, T-8, and T-9. All of these transformers have taps on the primary windings to correct the output voltage when a variation in line voltage occurs. These transformers are factory-connected for correct output when the line voltage is 220 volts. When the line voltage variation is great enough to affect the operation of the equipment, the connections to the taps on the primary windings must be changed to obtain the correct output voltage. The taps are labeled 1, 2, 3, 4, and 5 to provide connections for a-c line voltages of 210, 200, 230 and 240 volts.

(3) 12-volt supply transformer T-1. This transformer has taps on both the primary and secondary windings. These

are connected at the factory to give an output of 12 volts dc at 4-0 amperes load from the rectifier when the line voltage is 220 volts. The taps on the primary winding can be connected to compensate for variations in the input voltage from 210 to 240 volts. The tapped secondary allows the application of the correct a-c voltage to the rectifier for obtaining a 12-volt d-c output from the rectifier.

b. Checking and Adjustment of Relays. Before starting this procedure, set the LOW VOLTAGE (S-6) and the HIGH VOLTAGE (S-5) switches to OFF. Close the main three-phase a-c power line switch. Set circuit breaker K-1 to ON. Rotate LINE VOLTAGE switch S-1 through each of its three positions. The AC LINE meter should indicate between 215 and 225 volts in each position of the LINE VOLTAGE switch.

(1) Start-stop switch S-7 and relay 0-2. Insert a jumper between the terminals marked STOP on the main terminal board. Push in the START button and hold it in until the start-stop relay closes. Release the START button; the relay will remain closed. Push in the STOP button; the relay will open.

(2) Time-delay relay K-2. Set the time-delay relay dial at 5. Push the START button. The start-stop relay will close, the blower motor will start, and after a 30-second delay the time-delay relay will close. Push in the STOP button.

(3) Interlock relay 0-1. Connect a jumper between terminals marked INTERLOCK on the main terminal board E-14. All panels and doors with interlock switches must be closed. Push in the START button. After the time-delay relay closes, close the LOW VOLTAGE switch. The interlock relay will close. Open one of the doors that is equipped with an interlock switch. The interlock relay should open. Close the door and move the LOW VOLTAGE switch to the OFF position. Push in the STOP button.

TABLE 1

INSTALLATION AND SETTINGS OF VARIABLE COMPONENTS FOR DIFFERENT BANDS OF OPERATION

(1) Band	(2) Crystal frequency (mc)	(3) Operating frequency (mc)	(4) Switch position		(5) Chokes L-6, L-9, L-12 (mc)
			1ST AMP PLATE BAND switch	2ND AMP PLATE BAND switch	
I 2.0 to 2.4 mc	2.0-2.4	2.0-2.4	2.0-3.5 MC	2.0-3.5 MC	2.0-6.5
II 2.4 to 2.8 mc	2.4-2.8	2.4-2.8	2.0-3.5 MC	2.0-3.5 MC	2.0-6.5
III 2.8 to 3.2 mc	2.8-3.2	2.0-3.5	2.0-3.5 MC	2.0-3.5 MC	2.0-6.5
		3.0-3.2	3.5-4.5 MC	3.5-4.5 MC	2.0-6.5
IV 3.2 to 4.4 mc	3.2-4.4	3.2-3.6	3.5-4.5 MC	3.5-4.5 MC	2.0-6.5
		3.6-4.4	3.5-4.5 MC	3.5-4.5 MC	2.0-6.5
V 4.4 to 7.0 mc	4.4-5.0	4.4-4.5	3.5-4.5 MC	3.5-4.5 MC	2.0-6.5
		4.5-6.5	4.5-7.0 MC	4.5-7.0 MC	2.0-6.5
		6.5-7.0	4.5-7.0 MC	4.5-7.0 MC	6.5-18.0
VI 7.0 to 10.0 mc	3.5-5.0	7.0-10.0	7.0-13.0 MC	7.0-13.0 MC	6.5-18.0
VII 10.0 to 14.0 mc	2.5-3.5	10.0-14.0	4.5-7.0 MC	4.5-7.0 MC	6.5-18.0
VIII 14.0 to 16.0 mc	3.5-4.0	14.0-16.0	7.0-13.0 MC	7.0-13.0 MC	6.5-18.0
IX 16.0 to 18.0 mc	4.0-4.5	16.0-18.0	7.0-13.0 MC	7.0-13.0 MC	6.5-18.0
X 18.0 to 19.8 mc	4.5-4.95	18.0-19.8	7.0-13.0	7.0-13.0	18.0-26.0
XI 19.8 to 22.0 mc	4.95-5.5	19.8-22.0	7.0-13.0	7.0-13.0	18.0-26.0
XII 22.0 to 26.0 mc	5.5-6.5	22.0-26.0	7.0-13.0	7.0-13.0	18.0-26.0

TABLE I

INSTALLATION AND SETTINGS OF VARIABLE COMPONENTS FOR DIFFERENT BANDS OF OPERATION

(7) Install third amplifier plate coil (L-7) (mc)	(8) L-shaped jumper	(9) Padding capacitor		(10) Final amplifier plate coil (L-10)	(11) Install antenna coil (L-11) (mc)
		C-37 series	C-38 parallel		
2.0-3.6	In (fig. 67)	--	Both in (fig. 67)	14 turns. No jumper connection	2.0-3.6
2.0-3.6	In (fig. 68)	-- --	Both in (fig. 68)	11 turns. Link No. 1 closed	2.0-3.6
2.0-3.6	In (fig. 69)	--	One in (fig. 69)	11 turns. Link No. 1 closed	2.0-3.6
2.0-3.6	In (fig. 69)	--	One in (fig. 69)	11 turns. Link No. 1 closed	2.0-3.6
2.0-3.6	In (fig. 70)	--	One in (fig. 70)	9 turns. Link No. 2 closed	2.0-3.6
3.6-7.0	In (fig. 70)	--	One in (fig. 70)	9 turns. Link No. 2 closed	3.6-6.5
3.6-7.0	In (fig. 71)	--	--	7 turns Link No. 3 closed	3.6-6.5
3.6-7.0	In (fig. 71)	--	--	7 turns. Link No. 3 closed	3.6-6.5
3.6-7.0	In (fig. 71)	--	--	7 turns. Link No. 3 closed	6.5-10.0
7.0-10.0	In (fig. 72)	--	--	4 turns. Link No. 4 closed	6.5-10.0
10.0-14.0	In (fig. 73)	--	--	3 turns. Link No. 5 closed	6.5-10.0
14.0-18.0	Out (fig. 74)	Both in (fig. 74)	--	2 turns. Link No. 6 closed	10.0-18.0
14.0-18.0	Out (fig. 75)	One in (fig. 75)	--	2 turns. Link No. 6 closed	10.0-18.0
18.0-22.0	Out (fig. 75)	One in (fig. 75)	--	2 turns. Link No. 6 closed	18.0-26.0
18.0-22.0	Out (fig. 76)	Both in (fig.	--	5/6 turn. (see fig. 76)	18.0-26.0
22.0-26.0	Out (fig. 77)	One in (fig. 77)	--	5/6 turn. (see fig. 77)	18.0-26.0

The Rectifier system shown in figure 92 incorporates START and STOP relays O-13 and O-14, making it possible to turn the equipment on and off from a remote location by the use of dialing equipment or momentary contact switches. Local START and STOP control is not affected by addition of these relays. The relay coils have their leads brought out to terminal board (E-14, fig. 92) to the two top terminals designated START-STOP. To operate the relays, the respective terminals are connected to -12 volts by means of the remotely located dialing unit or momentary contact switches. Remotely controlled START-STOP relays, are not incorporated in the Rectifier system shown in figure 94.

31. Initial Adjustment of Radio Transmitter Model 96D.

Before making any adjustments in the transmitter, move the HIGH VOLTAGE and the LOW VOLTAGE switches in the rectifier to the OFF positions.

a. Pull out the high-voltage switch handle (fig. 3) at the bottom front of the transmitter cabinet. Be sure the handle is out as far as possible.

b. Move the a-c switch S-7 to the OFF position.

c. Turn the slide locking handle one-fourth turn to the left and pull the slide forward.

d. Install the crystal in the socket on the exciter unit. The crystal must be of the correct frequency. The way to determine the frequency of the crystal needed is as follows:

(1) Determine the frequency at which the transmitter is to operate.

(2) If the operating frequency is to be between 2.0 and 5.0 mc, use a crystal of the same frequency.

(3) If the operating frequency is to be

between 5.0 and 10.0 mc, divide the operating frequency by two. The result is the frequency of the crystal that must be used. Example: The transmitter is to be operated at 8.6 mc. The correct crystal frequency is 4.3 mc.

(4) If the operating frequency of the transmitter is to be between 10.0 and 26.0 mc, divide the operating frequency by four. The result is the frequency of the crystal that must be used. Example: The transmitter is to be operated at 15.6 mc. The correct crystal frequency is 3.9 mc.

e. Set the 1ST AMP PLATE BAND SWITCH and the 2ND AMP PLATE BAND SWITCH (fig. 27) to the correct frequency band as determined by the desired frequency of operation and columns 4 and 5 of table I.

f. Three sets of R.F. choke L6, L9, L12) are required to cover all frequencies from 2.0 to 26.0 mc. Each set is composed of three identical chokes used as 3rd amplifier plate choke, final amplifier plate choke, and final amplifier grid choke, respectively. These chokes fit into fuse clips as shown in Fig. 28. The chokes are distinguished by the number of turns and the wire size. The 2.0 to 6.5 mc chokes have 410 turns of No. 28 enameled wire. The 6.5 to 18.0 mc chokes; 115 turns of No. 20 enameled wire; the 18.0 to 26.0 mc chokes, 60 turns of No. 18 enameled wire. The correct chokes, as determined by the desired frequency of operation and column 6 of Table I, may now be installed in their respective fuse type clips (fig. 28).

g. Mount the correct third amplifier plate coil (L-7), as determined by the desired frequency of operation and column 7 of table I, in place (fig. 28). Mount the coil on the stand-off insulators by means of the four mounting holes.

h. Install the L-shaped jumper bar and the padding capacitors (C-37 and C-38), as determined by the desired frequency of operation and columns 8

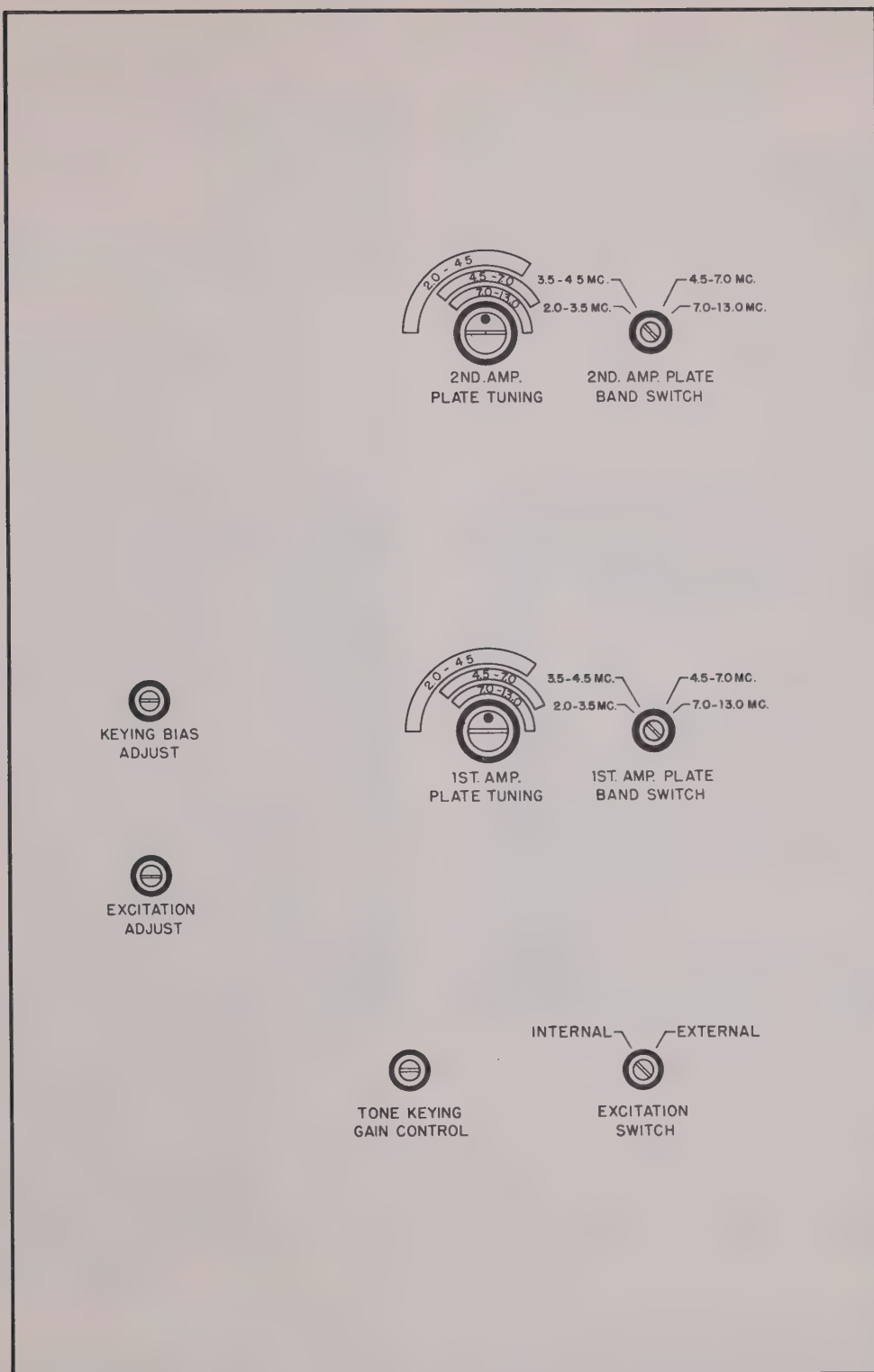


Figure 27. Radio Transmitter Model 96D, exciter chassis controls

and 9 of table I (figs. 67 through 77).

Warning: Handle capacitors C-37 and C-38 carefully. Use gloves or a thick cloth to protect the hands in case of breakage.

i. Connect links on the final amplifier plate coil (L-10), as determined by the desired frequency of operation and column 10 of table I (figs. 67 through 77).

j. Install the correct antenna coil (L-11), as determined by the desired frequency of operation and column 11 of Table I. A special type antenna coil (L-11E) is used to cover the frequency range of 18.0 to 26.0 mc. Instructions for installation of this coil are given in paragraph k. The following instructions cover installation of antenna coil (L-11A (2.0 to 3.6 mc), antenna coil L-11B (3.6 to 6.5 mc), coil L-11C (6.5 to 10.0 mc) or coil L-11D (10.0 to 18.0 mc):-

(1) Remove the shaft support at the rear of the final amplifier plate inductor assembly. This is a bakelite strip held to the assembly by friction catches. Remove by pulling straight back.

(2) Insert the antenna coil inside the assembly from the rear. The end of the coil with the two silver-plated slotted lugs is the front end.

(3) Slide the coil forward and rotate it so that the slotted lugs line up with the binder head screws in the coil carriage terminals.

(4) Push the coil forward against the coil carriage.

(5) Tighten the two binder head screws, thus making both mechanical and electrical connection between the coil carriage and the coil.

k. A special antenna coil is used to cover 18.0 to 26.0 mc. This coil is shown in Figure 29. The coil is made in two parts which must be individually slipped into place inside the final ampli-

fier plate coil. The following instructions apply:-

(1) Turn the ANTENNA COUPLING control fully counterclockwise so that the coil carriage is forward against the stop nuts. This aids in placing the coil in position.

(2) Screw insulated bushing to the coil half that has a round spacer affixed to one half.

(3) Insert this half of the coil with its lead down, and placed between threaded shaft and insulated frame. See fig. 30.

(4) Twist the top of the coil over the threaded shaft. See fig. 31.

(5) Next, turn the coil clockwise and fit slotted portion of coil on ceramic frame. See fig 32.

(6) Then gently pry the coil lead up and over the threaded shaft. Fasten the lead to the lower terminal of the antenna

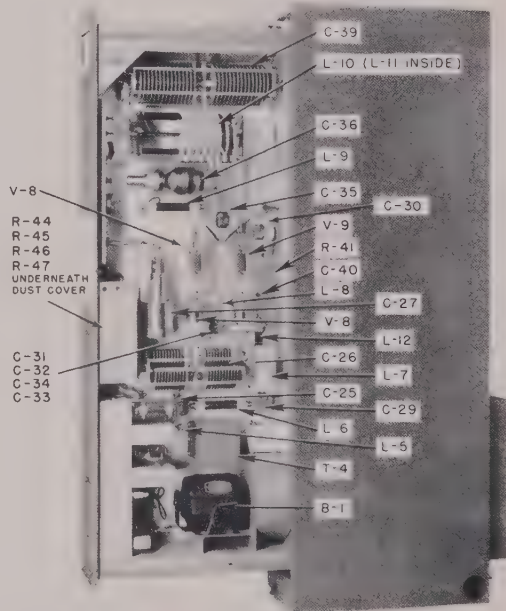


Figure 28. Radio Transmitter Model 96D, view of interior slide

coil carriage.

(7) Insert front half of coil by first turning the section so that its lead is perpendicular to the thread shaft. Place on the horizontal insulated frame and in so doing, the lead will be turned in the direction of the threaded shaft. See Fig. 33.

(8) This lead of the coil is then fastened to the upper terminal of the coil carriage.

(9) Connect both halves of the coil together by screws at the spacers, which are threaded. Figure 34 shows the coil connected and in place.



Figure 29. Radio Transmitter Model 96D, antenna coil L-11E

1. Set the 3RD AMP PLATE, FINAL AMP PLATE, and ANTENNA TUNING controls as determined by the desired frequency of operation and figures 78 through 88.

m. Check to see that all connections are tight and that all components that fit in clips are held securely in place.

n. Push the slide into the cabinet and

turn the slide lock handle one-quarter turn to the right (clockwise) to lock the slide in the cabinet.

32. Tuning Procedure

The tuning procedure consists of adjusting the tuning capacitors, the neutralizing capacitor, the antenna coupling coil, and the antenna tuning capacitor for optimum performance.

a. Remove fuse F-12 (fig. 21) and close the fuse panel door to set the interlock switch.

b. Operate the rectifier unit with the

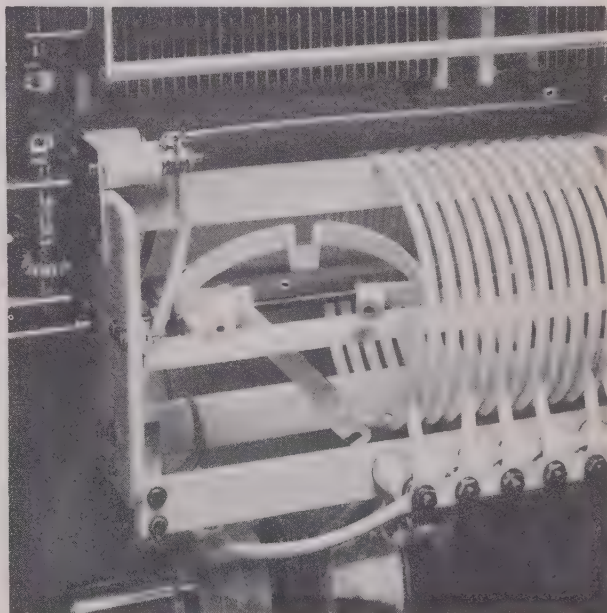


Figure 30. Radio Transmitter Model 96D, antenna coil L-11E, installation step 1

exception of setting the HIGH VOLTAGE switch to ON.

c. Set the a-c switch S-7 (fig. 21) and the CHANNEL CONTROL switch S-6 (fig. 25) to ON.

d. Set the EXCITATION ADJUST (fig. 27) to the maximum clockwise position. Rotate METER SWITCH S-4 (fig. 25) to the 2ND AMP GRID position.

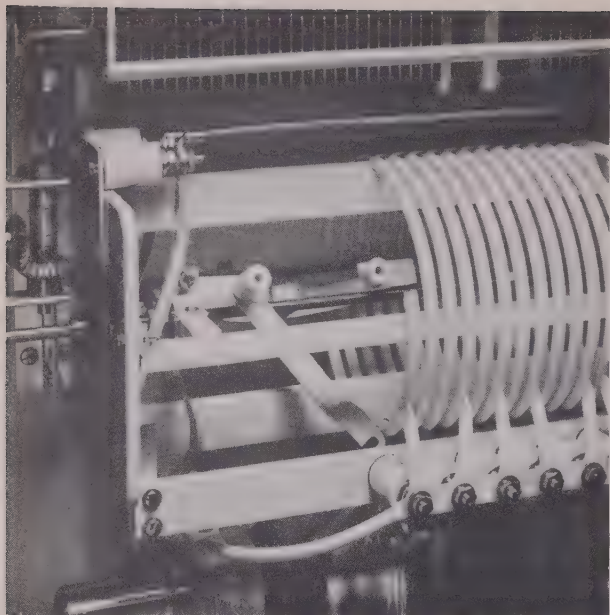


Figure 31. Radio Transmitter Model 96D, antenna coil L-11E, installation step 2

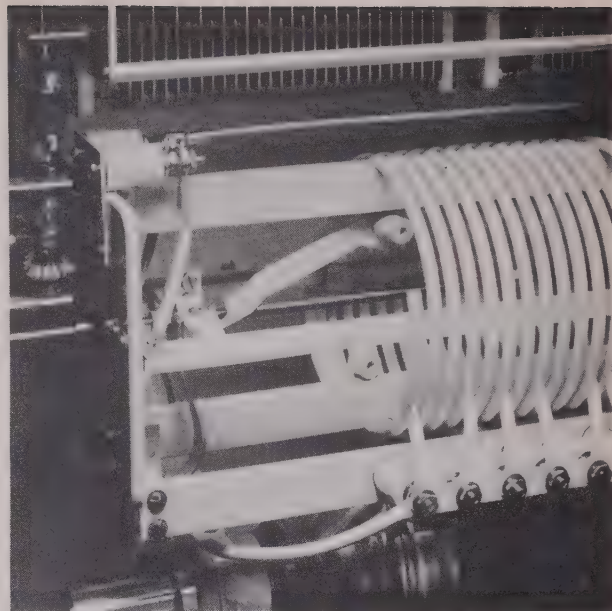


Figure 32. Radio Transmitter Model 96D, antenna coil L-11E, installation step 3

e. Set TEST KEY S-5 (fig. 25) to ON and adjust the 1ST AMP PLATE TUNING control until the meter reads maximum current. (See note at the end of this paragraph.) Then set the TEST KEY to its center position.

Caution: Do not hold the TEST KEY down for long periods. At this stage, the screen grid current of V-4, the third amplifier tube, is at maximum. Prolonged holding of the TEST KEY may result in damage to tube V-4.

f. Set the METER SWITCH to the 3RD AMP GRID position and set the TEST KEY to ON. Adjust the 2ND AMP PLATE TUNING control (fig. 27) for maximum indication on the meter; that is, maximum third amplifier grid current. (See note at the end of this paragraph.)

g. Repeat steps e and f above.

h. Back off (move counterclockwise) the EXCITATION ADJUST control (fig. 27) until the third amplifier grid current is about 5 ma (milliamperes). Set the TEST KEY to its center position.

i. Set the HIGH VOLTAGE switch in the rectifier power unit (fig. 26) to the ON position.

j. Turn the NEUTRALIZING CONTROL, C-27 (fig. 25), counterclockwise to near minimum capacity.

k. Adjust the FINAL AMP PLATE control C-36 (fig. 25) to a position well off resonance. The resonance point is taken as the point at which the FINAL AMP PLATE control was set from the plate tuning curves. Adjust the FINAL AMP PLATE control until the counter for this control indicates a position well off the resonance point as given in the tuning curve.

l. Rotate the ANTENNA COUPLING control L-11 (fig. 25) in a counterclockwise direction until the antenna is well decoupled; that is, until the associated counter reads a low numerical value.

m. Rotate the METER SWITCH to the FINAL AMP GRID position. Set the TEST KEY to ON and adjust the 3RD AMP PLATE control, C-26 (fig. 25) for maximum current in the final amplifier

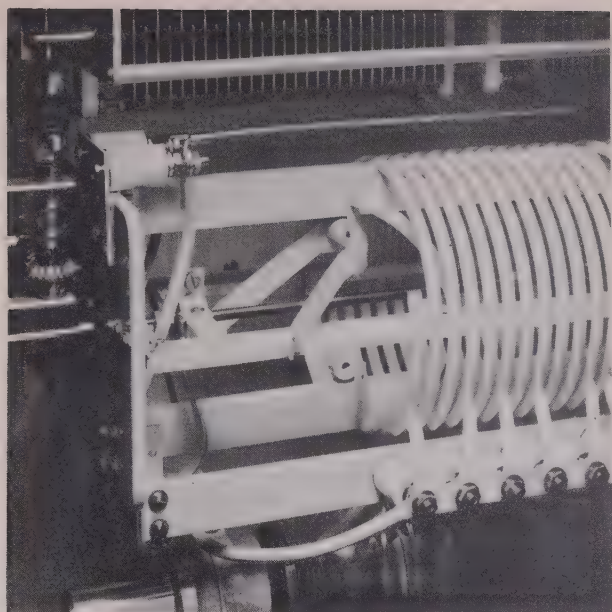


Figure 33. Radio Transmitter Model 96D, antenna coil L-11E, installation step 4

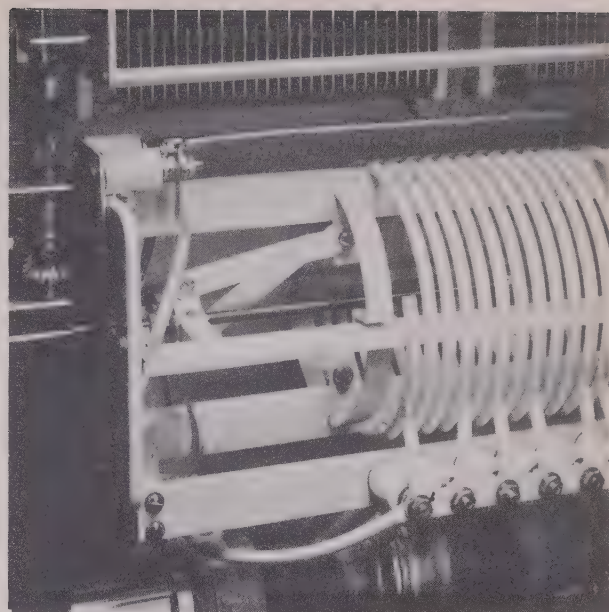


Figure 34. Radio Transmitter Model 96D, antenna coil L-11E, installed

grid circuit as indicated by the meter.

n. Adjust the FINAL AMP PLATE control until the final amplifier grid current dips to a minimum as indicated by the meter.

o. If step n. results in a minimum reading near or at zero, back off the FINAL AMP PLATE tuning control until the grid current is about 20 ma. Return 3RD AMP PLATE for maximum grid current. Rotate the NEUTRALIZING CONTROL clockwise (increasing capacity) and note that the grid current starts to increase. Keeping the 3RD AMP PLATE at resonance as indicated by maximum grid current, slowing increase the neutralizing capacity; and, as neutralization is approached, the FINAL AMP PLATE may be brought nearer resonance, thus reducing grid current.

p. Rotate the NEUTRALIZING CONTROL clockwise, meanwhile keeping the third amplifier plate and the final amplifier plate at resonance, that is, maximum and minimum grid current, respectively. Increase the neutralizing

capacity until the point is reached where rotating the FINAL AMP PLATE through resonance has the least effect on the grid current as indicated by the meter. Set the TEST KEY to its center position.

q. Move the HIGH VOLTAGE switch S-5 in the rectifier power unit to the OFF position. Open the fuse and relay panel door on the transmitter. Install a 1.5-ampere, 5,000-volt fuse in the clips marked TUNE ONLY. This will connect the plates of the final amplifier tubes to the 2,100-volt supply. Close the fuse panel door tightly to set the interlock switch. Move the HIGH VOLTAGE switch in the rectifier power unit to the ON position.

r. Set the TEST KEY to ON and adjust the FINAL AMP PLATE control for minimum plate current as indicated on the FINAL AMP PLATE current meter. Set the TEST KEY to its center position.

s. Set the HIGH VOLTAGE switch in the rectifier power unit to the OFF position. Open the fuse and relay panel door on the transmitter. Remove the fuse from the clips marked TUNE ONLY and install the fuse in the clips marked 5,000

VOLTS at the right-hand side of the fuse panel. This connects 4,200 volts to the plates of the final amplifier tubes. Close the fuse and relay panel door tightly to set the interlock switch. Set the HIGH VOLTAGE switch in the rectifier power unit to the ON position.

t. Set the TEST KEY to ON and adjust the EXCITATION ADJUST control to give a final amplifier grid current of 50 to 80 ma. At operating frequencies above 10 mc, the EXCITATION ADJUST control should be set at maximum (fully clockwise) and left in that position.

u. Readjust NEUTRALIZING CONTROL slightly for minimum change in grid current as FINAL AMP PLATE control is rotated slightly through the resonance point.

v. Check the setting of the ANTENNA TUNING control C-39 (fig. 26) with the tuning curves of figures 86, 87 & 88. At frequencies below 5 mc, the adjustment of the ANTENNA TUNING control will have little effect on the final amplifier plate current. Optimum adjustment is best obtained by rocking the FINAL AMP PLATE control through resonance while adjusting the ANTENNA TUNING control for maximum plate current.

w. Rotate the ANTENNA COUPLING control, L-11, clockwise to obtain desired loading on the final amplifier, keeping the final amplifier plate circuit in resonance; that is, adjusting FINAL AMP PLATE control for minimum plate current flow as indicated by the final amplifier plate meter. The final amplifier plate meter should indicate approximately 0.925 ampere when the EXCITATION ADJUST control is set to give a final amplifier grid current of 75 ma.

Note. In tuning the circuits in the exciter unit, note that the band coverages are indicated next to the adjustment. In any case where the resonance point, which is the maximum grid current point in the following stage, does not

fall within the sector indicated for the frequency desired, the circuit in question is tuned to the wrong harmonic.

33. Final Tuning Adjustments

a. Overload Adjustment. In order for the overload adjustment to be made, the transmitter must be operating, and when the TEST KEY is set to ON, the final amplifier plate meter should indicate 0.925 ampere. Set the TEST KEY to ON and adjust the ANTENNA COUPLING control (clockwise) until the final amplifier plate meter indicates 1.0 ampere. Slowly adjust OVERLOAD ADJUST control R-42 (fig. 25) (rotate clockwise) until the overload relay operates. This relay, in operating, breaks the interlock circuit, which causes the interruption of high- and low-voltage supplies. This relay will keep cycling until the plate current of the final amplifier is low enough to permit the relay to stop operating. Decrease the total plate current by rotating the ANTENNA COUPLING control counterclockwise until the overload relay stops operating. This should occur when the final amplifier total current is approximately 0.975 ampere. Readjust the ANTENNA COUPLING control to give a final amplifier plate current of 0.925 ampere.

b. Underload Adjustment. Rotate the ANTENNA COUPLING control counterclockwise until the final amplifier plate current is approximately 0.5 ampere. Starting with UNDERLOAD ADJUST control R-43 (fig. 25) completely counterclockwise, move it clockwise until the underload relay releases. This will cause the associated modulator to stop. Adjust the ANTENNA COUPLING control to give a final amplifier plate current of 0.925 ampere with the final amplifier plate circuit resonated. Set the TEST KEY to its center position.

c. Keying Bias Adjustment. With the transmitter operating, rotate the KEYING BIAS ADJUST control R-30 (fig. 27) clockwise slowly until the final amplifier grid current meter starts to indicate.

Then rotate the KEYING BIAS ADJUST control counterclockwise until the current is zero. Then rotate the KEYING BIAS ADJUST control counterclockwise approximately 5° .

d. Tone Keying Gain Control Adjustment. Rotate the TONE KEYING GAIN CONTROL completely clockwise. Key the transmitter from the remote control point. Reverse the control until the final amplifier grid current starts to decrease; then advance the control 10 to 20 degrees. There may be less final amplifier grid current when the transmitter is keyed from a remote station as compared with local keying. To overcome this, adjust the EXCITATING ADJUST control to give the correct value of final grid current when the transmitter is remotely keyed.

(1) When tone keying is used, the center-tap of resistor or audio frequency coil connected across terminals 13 and 14 (fig. 91) is grounded. If a resistor is used its value should be between 2,000 and 5,000 ohms total resistance. If an audio frequency coil is used, it should have high impedance at the tone keying frequency and low DC resistance. The audio coil can be the secondary of a transformer used to couple the output of a tone generator to the tone keying line.

e. The instructions in the preceding paragraph apply when the transmitter is keyed by application of a tone as described in paragraph 58. When a keying relay is provided in Radio Transmitter Model 96D, keying may also be accomplished by grounding terminal 6 of terminal strip E8, (fig. 91). Grounding this terminal completes the coil circuit of keying relay 06, (fig. 91) and keys the transmitter by operation of the relay contacts. When relay keying is used, the TONE KEYING GAIN CONTROL, R24, should be set at minimum, completely counter-clockwise. KEYING BIAS ADJUST control, R30, must be adjusted as described in paragraph 33c.

(1) The sensitivity of keying relay 06 is such that it will operate satisfactorily if terminal 6 is grounded through a circuit of 15,000 ohms or less. Thus satisfactory remote keying can be obtained provided circuit resistance of the keying circuit, including ground return, is not greater than 15,000 ohms.

(2) Relay keying cannot be accomplished until the channel control circuit is energized. Therefore the keying relay will be inoperative unless the channel has been selected for operation. Channel selection is accomplished simply by grounding either terminal 13 or 14 of terminal strip E8, (fig. 91).

(3) As shown in Figure 35, when keying relay 06 is supplied, it will be located within the exciter unit chassis, adjacent to receptacle J-2.

f. External Excitation. All the previous adjustments and the tuning procedure have been made with the EXCITATION SWITCH in the INTERNAL position. If the transmitter is going to be excited from an external source, as in teletypewriter operation, move the EXCITATION SWITCH to the EXTERNAL position. Then repeat the tuning procedure as described in paragraph 32.

g. Completion. If a dummy antenna has been used during the tuning procedure, remove the dummy antenna and connect the antenna leads to the antenna binding posts at the top of the transmitter. Retune the final amplifier and antenna circuits (par. 32h through w). Then set the CHANNEL CONTROL switch to OFF.

34. Changing Frequency of Operation

a. Move HIGH VOLTAGE switch S-5 in the rectifier to the OFF position.

b. Pull out the high-voltage switch handle (fig. 3) at the bottom front of the transmitter cabinet. Be sure the handle is out as far as possible.

c. Open the fuse panel door.

d. Before removing the four cartridge type fuses (F-9, F-10, F-11, and F-12) from their clips, short the ends of the fuses with a shorting stick. Then remove the fuses.

e. Move the a-c switch S-7 to the OFF position.

f. Turn the slide locking handle (fig. 3) one-fourth turn to the left and pull the slide forward.

g. With a shorting stick, discharge high-voltage capacitors, C-30, and C-35.

Warning: The preceding seven steps must be performed in the order given every time the transmitter slide is opened.

h. If it is necessary to keep other transmitters operating, close the HIGH VOLTAGE switch in the rectifier power unit.

i. Perform steps d through l in paragraph 31.

j. Set HIGH VOLTAGE switch S-5 in the rectifier power unit to the OFF position.

k. Replace the fuses removed in step d above.

l. Push the handle at the bottom front of the cabinet as far in as possible.

m. Move the a-c line switch S-7 to the ON position. The transmitter is

now ready for the tuning procedure (par. 32).

- NOTE -

A crystal shift relay, 07 (fig. 91), when supplied as a part of the Model 96D transmitter, is installed under the oscillator shield can in the exciter unit. This relay is located within the exciter unit chassis at the lower right corner. See Figure 35 for the placement of this relay. One set of contacts connects either of two crystals into the circuit. The crystal connected between pins 2 and 3 of the dual crystal holder is connected into the circuit when the relay is not operated. When the relay is operated the crystal connected between pins 1 and 3 is connected into the circuit.

a. The other set of contacts is connected in parallel with the channel control switch so that whenever the relay is operated the channel will be automatically selected for operation. This makes it unnecessary to have extra contacts on the dialing unit or other device used for remote channel selection, for simultaneous operation of the channel control relay and the crystal shift relay.

b. One end of the relay coil is connected to the ungrounded side of one of the 6.3 volt filament supplies and the other end is connected to terminal 3 of terminal strip E8, (fig. 91). The crystal shift relay is operated by grounding this terminal.

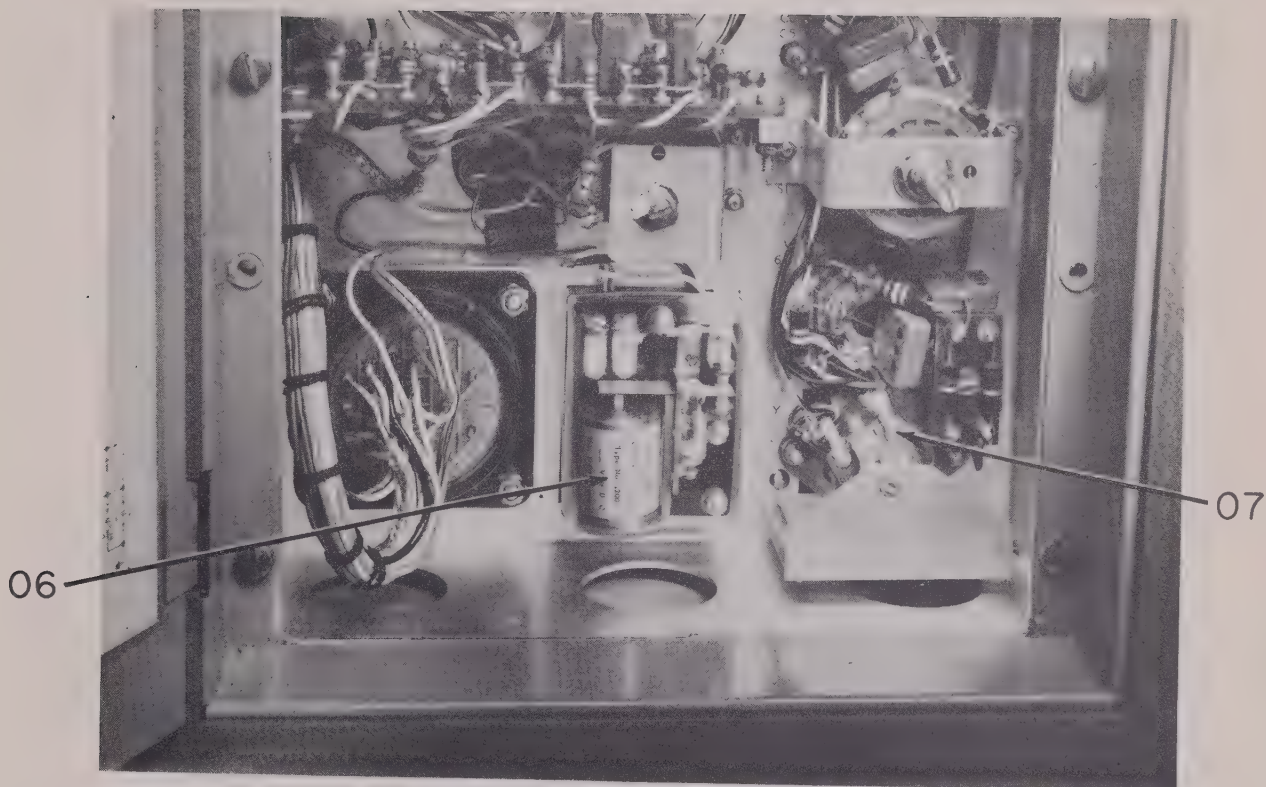


Figure 35. Radio Transmitter Model 96D, location of keying and crystal shift relays. (Optional items).

CHAPTER 3

MAINTENANCE INSTRUCTIONS

SECTION I. TOOLS AND EQUIPMENT

35. Tools and Materials Supplied with Equipment

Organizational tools and materials supplied with the equipment are listed in paragraph 10 on minor components.

36. Special Tools Supplied

No special tools are supplied.

SECTION II. PREVENTIVE MAINTENANCE SERVICES

37. Definition of Preventive Maintenance

PM (Preventive maintenance) is work

performed on equipment (usually when the equipment is not in use) to keep it in good working order so that breakdowns and needless interruptions in service will be kept to a minimum. PM differs from troubleshooting and repair since its object is to prevent certain troubles from occurring.

38. General Preventive Maintenance Techniques

a. Use #0000 sandpaper to remove corrosion.

b. Use a clean, dry, lint-free cloth for cleaning.

(1) If necessary, except for electrical contacts, moisten the cloth or brush with dry cleaning solvent; then wipe the parts dry with a cloth.

(2) Clean electrical contacts with a cloth moistened with carbon tetrachloride; then wipe them dry with a dry

cloth.

c. If available, dry compressed air may be used, at a line pressure not exceeding 60 pounds per square inch, to removal dust from inaccessible places; be careful, however, or mechanical damage from the air blast may result.

39. Performing Preventive Maintenance

The PM operations described in the subparagraphs which follow should be performed by organizational personnel at the intervals indicated.

Caution: Do not tighten screws, bolts, and nuts carelessly. Fittings tightened beyond the pressure for which they are designed will be damaged or broken.

a. Daily. (1) Clean exterior of cabinets.

(2) Check meter readings.

b. Weekly.

Caution: Disconnect all power before performing the following operations. Upon completion, reconnect power and check equipment for satisfactory operation.

(1) Clean interior of cabinets, exterior of old chassis, and all chassis, and all parts accessible without removal from the cabinet.

(2) Inspect filter capacitors C-1 through C-8 (rectifier) for leakage of oil or dielectric, for bulging, and for heating.

(3) Inspect power transformers T-1 through T-9 (rectifier) and T-2 through T-4 (transmitter) for excessive heating.

(4) Inspect all the fuses and fuse holders for corrosion, cracks, and lack of tension sufficient to insure good contact.

(5) Check meters for zero adjustment.

c. Monthly. Make visual inspection of the following, and tighten and/or clean, if necessary:

(1) Tube and crystal sockets and pins, for loose contacts, dirt, and corrosion. Check vacuum tubes; replace if necessary. Note that tubes including final letter W or Y in their nomenclature can replace tubes of the same type. For example, Tube JAN-6SN7W can replace Tube JAN-6SN7.

(2) All filter capacitors, for corrosion at the terminals.

(3) All resistors, for blistering, discoloration, and other evidence of overheating.

(4) The following switches, for dirt, corrosion, loose contacts, and unsatisfactory mechanical action: S-1, S-5, S-6, and S-7 (rectifier); S-1 through S-7 and S-12 (transmitter).

(5) The following multiple connectors, for dirt, corrosion, and loose contacts; P-1, P-2, J-1, and J-2 (rectifier); J-2 and P-2 (transmitter).

(6) All wires, cords, and cables, for cracked, cut, and frayed insulation.

(7) All terminal boards, for cracks, dirt, and loose connections.

(8) The following potentiometers, for unsatisfactory electrical and mechanical operation: R-17, R-30, R-42, and R-43 (transmitter).

(9) All mountings, machine screws, and nuts, for mechanical looseness.

(10) All visible terminals and connections, for looseness and corrosion.

(11) Moistureproof and fungiproof coatings, for breaks. (Retouch with a brush, if necessary.)

(12) Finish, for scratches, bare spots, and rust. (Retouch, if necessary.)

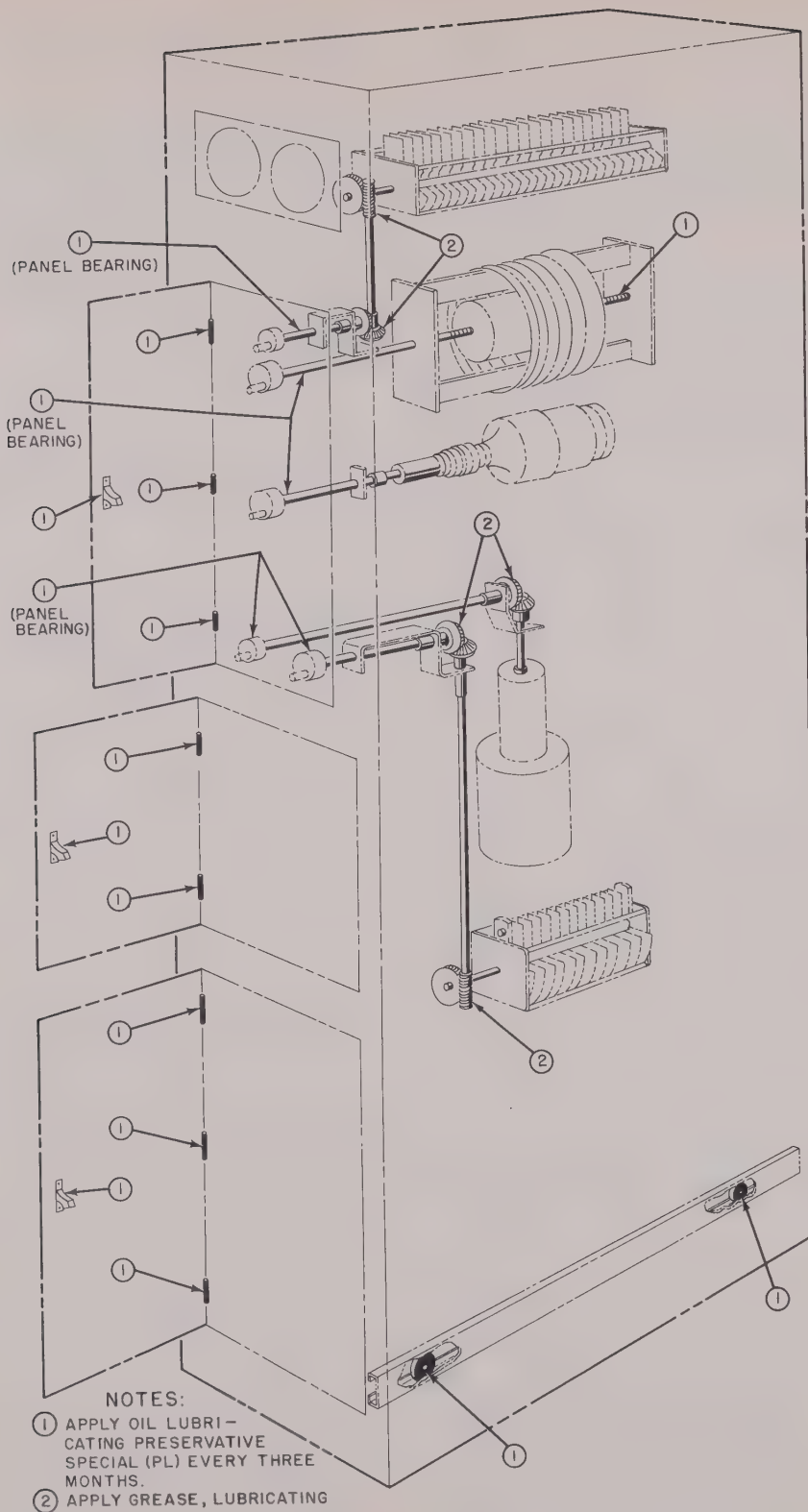


Figure 36. Radio Transmitter Model 96D, lubrication

(13) The following coils for dirt, corrosion, and damaged turns: L-1 through L-6 (rectifier); L-1 through L-12 (transmitter).

(14) All insulators, for cracks and dirt.

(15) Rectifier CR-1 (rectifier), for loose connections and dirt.

(16) Ventilating openings in cabinet, for dirt. Clean openings, when necessary, by using dry cleaning solvent and by blowing compressed air through them.

(17) All the relay contacts, for pits and build-ups and for improper alinement.

(18) All the relay coils, for dirt and damaged turns.

(19) The air filters, for dirt.

(20) The blower assemblies, for corrosion, loose mounting, overheating, and improper impeller action.

SECTION III. LUBRICATION

40. Lubrication Instructions

a. General. (1) The type of lubricant to be used, the interval, and specific instructions for each part are given for the transmitter and rectifier in figures 36 and 37.

(2) Gasoline will not be used as a cleaning fluid for any purpose. When the equipment is overhauled or repairs are made, parts should be cleaned with dry cleaning solvent.

(3) Carbon tetrachloride will be used as a cleaning fluid only in the following cases: for cleaning electrical equipment where inflammable solvents cannot be used because of fire hazard and for cleaning electrical contacts including plugs, relay contacts, switch contacts, etc.

b. Radio Transmitter Model 96D. Open the doors on the front panel as shown in figure 36. Wipe the door hinges with a dust-free, lint-free cloth and then lubricate as indicated in figure 36. Wipe off any excess lubricant. Turn the slide-locking handle one-quarter turn to the left and pull the slide out to the limit of its travel. Wipe off the slide rollers with a lint-free cloth and lubricate as indicated in figure 36. Wipe off excess lubricant. Clean the gears with a lint-free cloth moistened with dry cleaning solvent. Lubricate as indicated in figure 36.

c. Rectifier Power Unit Model 36D. Open the doors on the front and wipe the hinges with a clean lint-free cloth. Lubricate the door hinges as specified in figure 37.

41. Cleaning And Lubrication Of Air Filters

Remove the air filter from the back of the transmitter and rectifier cabinet (par. 69a (4)). To clean and lubricate the filters proceed as follows:

a. Flush the filter with clean water at a pressure of 20 pounds per square inch. Flush from dirty to clean side only, and until filter is clean.

b. Dry the filter with a blower or compressed air.

c. Spray both sides of the filter with oil with a pressure-fed airgun. Use a coarse spray at 4 gallons per minute and spray 1 ounce of oil on each side.

d. Let filter stand to allow excess oil to drain off.

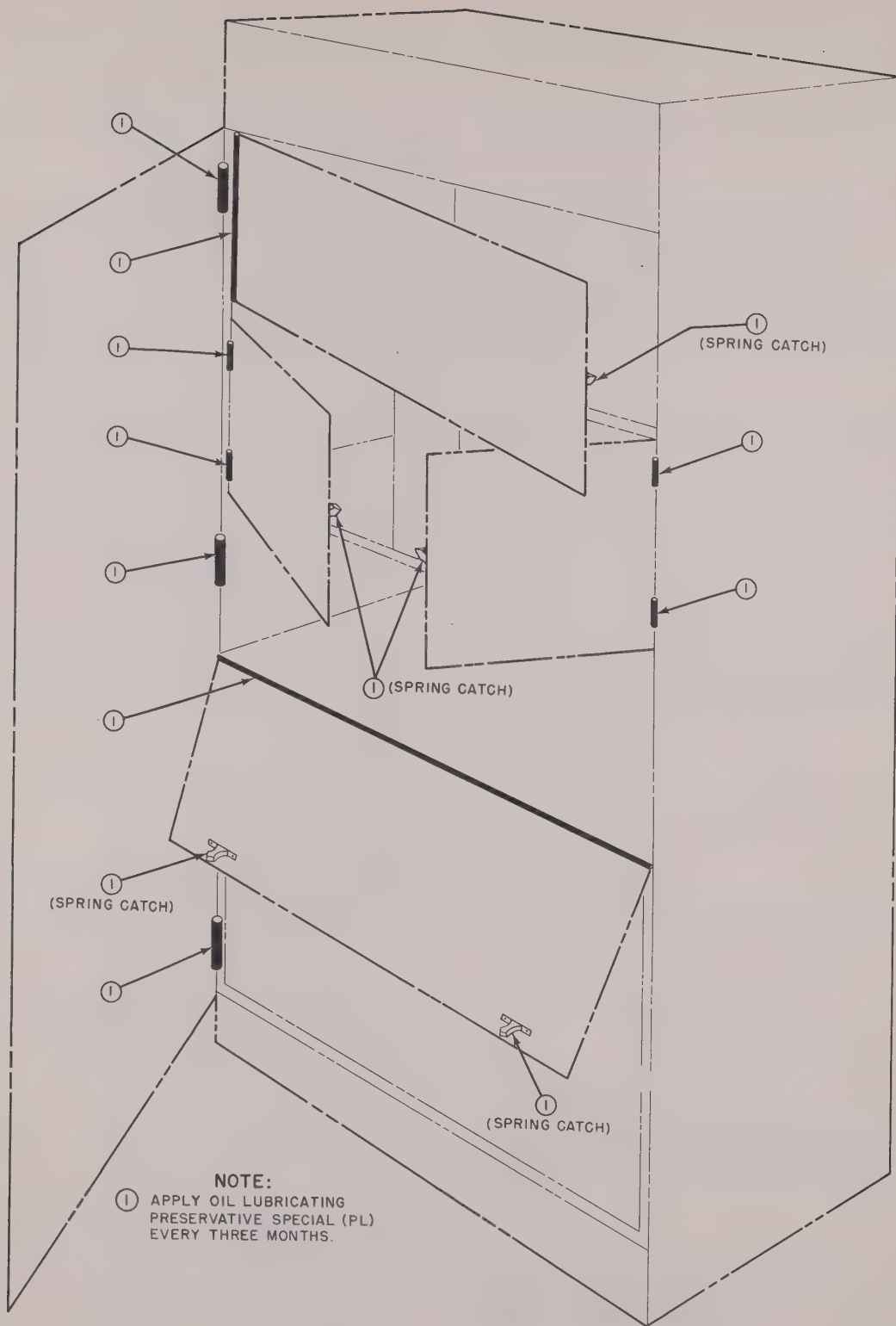


Figure 37. Rectifier Power Unit Model 36D, lubrication

Note. Use an oil that is non-odorous and has a flash point above 300° F. The following chart lists the oils to use at various temperatures:

Air temperature	SAE rating
+60° F	60
+30° F to +60° F	30
0° F to +30° F	20W
Below 0° F	10W

Caution: Do not operate equipment while air filters are out of the cabinets.

e. Reinstall air filter in rack at back of transmitter or rectifier cabinet.

42. Parts Lubricated by Manufacturer

The following chart lists the parts lubricated by the manufacturer prior to delivery of the equipment.

Major component	Parts lubricated
Radio Transmitter	Blower motor Gears Counters
Rectifier Power Unit	Blower motor

43. Parts Lubricated by Manufacturer Which Do Not Require Subsequent Lubrication

The parts listed in the chart below have been lubricated by the manufacturer and do not require subsequent lubrication.

Component	Part lubricated	Reason subsequent lubrication is not required
Radio Transmitter	Counters	Not accessible for servicing
	Blower motor	Permanent lubrication
Rectifier Power Unit	Blower motor	Permanent lubrication

SECTION IV. WEATHERPROOFING

44. Weatherproofing

a. General. Radio equipment, when operated under severe climatic conditions such as prevail in tropical, arctic, and desert regions, requires special treatment and maintenance. Fungus growth, insects, dust, corrosion, saltspray, excessive moisture, and extreme temperatures are harmful to most materials. The transmitter and the rectifier have had, during manufacture, a moistureproofing and fungproofing material applied to them. Also, the equipment has been designed

to operate at any temperature between -55° and +75° C (-67° and +167° F).

b. Tropical Maintenance. A special moistureproofing and fungproofing treatment has been devised which, if properly applied, provides a reasonable degree of protection. The equipment has received this treatment.

c. Winter Maintenance. Special precautions necessary to prevent poor performance or total operational failure of equipment in extremely low temperatures are fully explained in paragraph 29.

d. Lubrication. Refer to paragraph 40 through 43 for detailed instructions.

45. Rustproofing and Painting

a. When the finish on the equipment has been badly scarred or damaged rust and corrosion can be prevented by touching up bared surfaces. Use #00 or #000 sandpaper to clean the surface down to the bare metal. Obtain a bright smooth finish.

Caution: Do not use steel wool. Minute particles frequently enter the inside of the cabinets and cause harmful shorting or grounding of circuits.

b. When a touch-up job is necessary apply paint with a small brush. When numerous scars and scratches warrant complete repainting, remove the components from the cabinet and spray paint over the entire cabinet. Remove rust from the cabinet by cleaning corroded metal with dry cleaning solvent. In severe cases it may be necessary to use Dry Cleaning Solvent to soften the rust and to use sandpaper to complete the preparation for painting. Paint used will be authorized and consistent with existing regulations.

SECTION V. TROUBLE SHOOTING

46. Scope

a. The trouble-shooting and repair work that can be performed by operators and repairmen is necessarily limited in scope by the tools, test equipment, and replaceable parts on hand. Accordingly, trouble shooting is based on the performance of the equipment and the use of the senses in determining such troubles as burned-out tubes, cracked insulators, etc.

b. The following paragraphs in this section will help to determine which of the components, such as the receivers, monitor, or keyer, are at fault and will

aid in localizing the fault in that component to the defective stage or item, such as a tube or a fuse.

47. Visual Inspection

a. Failure of the equipment to operate properly will usually be caused by one or more of the following faults:

- (1) Worn, broken, or disconnected cords or plugs.
- (2) Burned-out fuses.
- (3) Defective tubes.
- (4) Inactive (dirty or cracked) crystal.
- (5) Loose connections.
- (6) Bad (dirty or broken) switch contacts.

b. When failure is encountered and the cause is not immediately apparent, check as many of the above items as is practicable before starting a detailed examination of the component parts of the system. If possible, obtain information from the operator of the equipment regarding performance at the time trouble occurred.

c. Visually inspect the antenna system for obvious abnormalities.

48. System Sectionalization of Trouble to a Component

System sectionalization consists of determining whether the trouble is in the transmitter, rectifier, modulator, remote control console, antenna, or power source.

a. Rectifier. (1) Operate the rectifier, if possible, and observe its performance. See equipment performance checklist (par. 50) for normal operating conditions.

(2) If the rectifier is completely dead, including the 12-volt rectifier, the trouble is undoubtedly in the external power source or power supply lines. The AC

LINE meter can be used to check this since no indication of power voltage indicates that there is no power being furnished to the rectifier.

(3) If only one component is dead, the trouble is in that component and is probably a fuse. Check fuse at an early stage in trouble shooting. Do not continue to burn out fuses before looking elsewhere for the basic source of the trouble.

(4) The over-all operation of the rectifier can be checked by observing the indications of the meters. Thus, the AC LINE meter provides information concerning the power source for the rectifier; the RF BIAS meter gives an indication of the operation of the bias supply rectifier; the LOW RF PLATE meter gives an indication of the operation of the +525-volt rectifier; and the FINAL PLATE meter provides information concerning the operation of the high-voltage rectifier.

b. Transmitter. (1) Operate the transmitter and observe its performance. See equipment performance checklist (par. 50) for normal indications.

(2) If the entire transmitter is dead, the trouble is undoubtedly in the rectifier or the power supply lines. Note that if the rectifier has failed, all the transmitters to which it furnishes power will be inoperative. If, however, all the transmitters except the one in question are operative, the rectifier is functioning correctly.

(3) If only one component is dead, the trouble is in that component and is probably a fuse. Check fuses at an early stage in trouble shooting. Do not continue to burn out fuses before looking elsewhere to determine the basic source of the trouble.

(4) The over-all operation of the r-f stages in the transmitter can be checked by using the meters.

(5) By use of procedures similar to the simple checks outlined above, the trouble can be isolated to a single stage.

49. Purpose and Use of Equipment Performance Checklist

a. General. The equipment performance checklist (par. 50) will help the operator to determine whether the transmitter and rectifier power unit are functioning properly. The list gives the item to be checked, the condition under which the item is to be checked, the normal indications and tolerances of correct operation, and the corrective measures the operator can take.

b. Action Or Condition. For some items, the information given in the action or condition column consists of the setting of the various switches and controls under which the item is to be checked. For other items it represents an action that must be taken to check the normal indication given in the normal indications column.

c. Normal Indications. The normal indications listed are the visible and audible signs that the operator should perceive when he checks the items. If the indications are not normal, the operator should apply the recommended corrective measures.

d. Corrective Measures. The corrective measures are those the operator can make without turning the equipment in for repairs. Reference in the table to chapter 5 indicates that the trouble cannot be corrected during operation and that trouble shooting by an experienced repairman is called for. If the set is completely inoperative and if the recommended corrective measures do not yield results, trouble shooting is necessary. However, if the tactical situation requires that communication be maintained and if the equipment is not completely inoperative, the operator must maintain the equipment in operation as long as it is possible to do so.

50. Equipment Performance Checklist

a. Rectifier Power Unit Model 36D.

	Item No.	Item	Action or condition	Normal indications	Corrective measures
P R E P	1	LOW VOLTAGE switch.	Turn to OFF.		
	2	HIGH VOLTAGE switch.	Turn to OFF.		
S T A R T	3	A-c line switch (wall-mounted)	Close switch.		
	4	Circuit breaker K-1.	Set to ON.		
	5	LINE VOLTAGE switch	Move to each of its three positions.	AC LINE meter M-1 indicates 220 volts in each position of switch.	Check external power supply. Check main power switch and fuses in power line.
E Q U I P M E N T	6	START-STOP buttons (S-7).	Press START button.	Start-stop relay closes. Blower motor runs.	Check fuses F-6 and F-11. Check fuses F-12 and F-13.
P E R F O R M A N C E				All tube filaments light. RF BIAS meter M-2 indicates -450 volts.	Check those tubes that do not become warm. Check fuses F-1, F-5, F-7, and F-8. Check tube V-1. Check fuses F-2 and F-9. Refer

a. Rectifier Power Unit Model 36D (contd).

	Item No.	Item	Action or condition	Normal indications	Corrective measures
P E R F O R M A N C E	7	LOW VOLTAGE switch.	Turn to ON.	Time delay relay closes. Interlock relay 0-1 closes.	to chapter 5 and bias rectifier circuit (par.65d). Check K-2 relay coil. Check internal and external interlock circuit. Check fuse F-4.
	8	HIGH VOLTAGE switch.	Turn to ON.	LOW RF PLATE meter M-3 indicates 525 volts. High-voltage primary contactor K-3 closes. FINAL PLATE meter M-4 indicates 4,200 volts.	Check tubes V-2 and V-3. Check fuses F-3 and F-10. Check interlock relay 0-1 contacts. Refer to chapter 5 and low-voltage rectifier circuit (par. 65). Check K-3 relay coil. Check V-4 through V-9. Refer to chapter 5 and high-voltage rectifier circuit (par. 65e).
S T C P	9	START-STOP button. (S-7).	Press STOP button.	Start-stop relay opens. Blower motor stops. All tube filaments go out.	Refer to chapter 5.

a. Rectifier Power Unit Model 36D (contd).

	Item No.	Item	Action or condition	Normal indication	Corrective measures
S T O P				Meters read as follows: RF BIAS, 0 volts; LOW RF PLATE, 0 volts; FINAL PLATE, 0 volts; AC LINE meter, 220 volts.	
	10	Circuit breaker K-1.	Set to OFF.	No reading on AC LINE meter.	
	11	A-c power switch (wall-mounted).	Open switch.	No reading on AC LINE meter.	

b. Radio Transmitter Model 96D.

	Item No.	Item	Action or condition	Normal indications	Corrective measures
P R E P A R A T O R Y	1	High-voltage switch (S-12).	Pull out.		
	2	CHANNEL CONTROL switch (S-6).	Set to OFF.		
	3	METER SWITCH (S-4).	Set to OFF.		
	4	TEST KEY (S-5).	Set in center position.		
	5	Crystal Y-1. 1ST AMP PLATE BAND SWITCH. 2ND AMP PLATE	Check for the correct components or position as determined		

b. Radio Transmitter Model 96D (contd).

	Item No.	Item	Action or condition	Normal indications	Corrective measures
	6	BAND SWITCH. Chokes L-6, L-9, and L-12. Tuning coils L-7 and L-11. L shape jumper. Padding capacitors C-37 and C-38. Shorting links on L-10. 3RDAMP PLATE tuning control FINAL AMP PLATE tuning control. ANTENNA TUNING con- trol.	by frequency of operation and table I (par. 31). Check for cor- rect position as determin- ed by fre- quency of op- erations and figures 69 through 77.		
	7	Rectifier Power Unit Model 36D.	Operate recti- fier unit.		See subpara- graph a above.
S T A R T	8	A-c line switch S-7.	Set to ON.	Tube V-1, V-2, V-3, V-5, V-6, and V-7 filaments light up.	Check fuses F-1 and F-2. Check tubes that do not light up.
	9	High-voltage switch (S-12).	Push in all the way.		

b. Radio Transmitter Model 96D (contd).

	Item No.	Item	Action or condition	Normal indication	Corrective measures
E Q U I P M E N T	10	CHANNEL CONTROL switch (S-6).	Set to ON.	Relay 0-5 closes.	Check fuses F-7, F-8, F-9, and F-10 and oper- ation of bias protection re- lay.
				Blower operates.	Check channel operate relay contacts.
				Tube V-4 lights up.	Check fuses F-3 and F-4. Check tube V-4.
				Final amplifier tubes light up.	Check fuses F-5 and F-6. Check tubes V-8 and V-9.
P E R F O R M A N C E	11	TEST KEY	Set to ON.	Transmitter operat- ing. Meter M-1, final plate current meter, indicates 0.925 ampere.	Retune. Refer to chapter 5.
	12	METER SWITCH (S-4).	Note reading on multiscale ammeter as switch is moved to each position as follows:	Meter reading for each position of METER SWITCH is as follows:	
			2ND AMP GRID	0 to 2 ma.	Check tubes V-1, V-2, and V-3.
			2NDAMP	15 to 55 ma.	Check tube V-3.

b. Radio Transmitter Model 96D (contd).

	Item No.	Item	Action or condition	Normal indications	Corrective measures
			PLATE		
			3RD AMP GRID	4 to 8 ma.	Check tube V-4.
			3RD AMP TOTAL.	80 to 190 ma.	Check tube V-4.
			FINAL AMP GRID	50 to 80 ma.	Check tubes V-7, V-8, and V-9.
					If the above checks do not correct the condition, retune and reset as described in paragraphs 32 and 33.
					If this does not eliminate the trouble, refer to chapter 4.
S T O P	13	TEST KEY (S-5)	Center position.	No indication on meter M-1, final plate current meter.	Check tube V-5; refer to chapter 4.
	14	High-voltage switch (S-12).	Pull out all the way	All relays open. Blower stops. Tube V-4, V-8, and V-9 filaments go out. All meter readings are zero.	Refer to chapter 5.
	15	A-c line switch (S-7).	Set to off.	Tube V-1, V-2, V-3, V-5, V-6, and V-7 filaments go out.	Refer to chapter 5.

CHAPTER 4

THEORY

SECTION I. RADIO TRANSMITTER MODEL 96D

51. Block Diagram of Radio Transmitter Model 96D (fig. 38)

Radio Transmitter Model 96D is the a-m type and operates at any frequency between 2.0 and 26.0 mc. The power output is 2,500 watts nominal on c-w, mcw, voice-modulated, or carrier-shift teletypewriter operation. For c-w and a-m operation, a built-in crystal-controlled oscillator is used to excite the transmitter. For teletypewriter operation, an external source of excitation is used to excite the transmitter. The

signal path is shown in figure 38, the block diagram of the transmitter. A complete schematic diagram of the transmitter is shown in figure 91.

a. Crystal Oscillator. The output frequency of the crystal-controlled oscillator tube, V-1, is the same as the crystal frequency. The crystal oscillator operates at any frequency between 2.0 and 6.5 mc, but the correct crystal for the desired frequency must be installed.

b. First R-F Amplifier. The first r-f amplifier, V-2, amplifies the output of the crystal oscillator and also acts as a buffer and frequency doubler. The buffer action prevents variations in

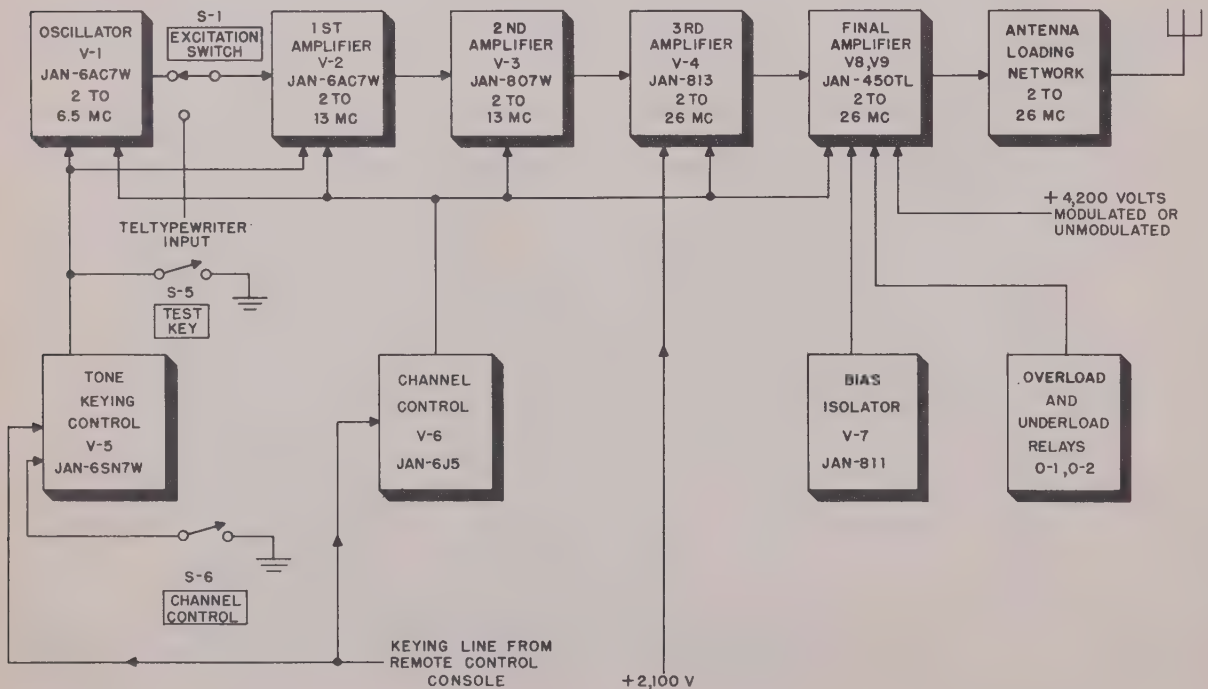


Figure 38. Radio Transmitter Model 96D, block diagram

loading which take place in the plate circuit from being impressed on the crystal oscillator. As a frequency doubler, the stage doubles the frequency of the crystal oscillator. This is accomplished by tunable components in the plate circuit. The input from the external source of excitation is fed directly to the control grid of V-2 when the EXCITATION switch is in the EXTERNAL position. The output of this stage is fed to the second r-f amplifier.

c. Second R-F Amplifier. The second r-f amplifier, V-3, amplifies the output of the first r-f amplifier. The plate circuit of the second r-f amplifier is tuned to the input frequency by the tunable components in the circuit. The output of the second r-f amplifier is coupled to the third r-f amplifier.

d. Third R-F Amplifier. The third r-f amplifier, V-4, amplifies the output of the second r-f amplifier and, when necessary, doubles the frequency of the second r-f amplifier. Frequency doubling is accomplished in the tunable plate circuit which is also the grid circuit of the final amplifier stage.

e. Final Amplifier Stage. The final amplifier stage consists of two tubes, V-8 and V-9, connected in parallel to amplify the output of the third r-f amplifier. The input circuit of the final amplifier is the tunable plate circuit of the third r-f amplifier. The output of the final amplifier stage is fed to the antenna loading network from the tunable plate circuit of the final amplifier.

f. Antenna Loading Network. The antenna loading network is an impedance matching device. It takes the output of the final amplifier stage and feeds it to the antenna, where the r-f energy is radiated into space. The network is tunable over the complete frequency range of the transmitter and couples the output of the final amplifier stage to either balanced or unbalanced antennas.

g. Channel Control. The purpose of the channel control circuit is to place the transmitter at the stand-by, ready for keying, when the transmitter is selected for use from the remote control station. Selection of the transmitter for operation causes current to flow in the plate circuit of the channel control tube, V-6. This plate current causes the channel control relay to close and thus causes the other relays in the transmitter to close, making all the necessary connections for the transmitter operation.

h. Tone Keying. The tone keying circuit acts as a relay to control the excitation from the crystal oscillator and the first r-f amplifier. When the transmitter is keyed from the remote control station, tube V-5 acts as a relay and causes the crystal oscillator and the first r-f amplifier to function. Thus the transmitter is excited and will radiate r-f energy.

i. Bias Isolation. The bias isolator tube allows the grids of the final amplifier tubes, V-8 and V-9, to draw a large amount of current without causing an appreciable change in the voltage of the r-f bias supply. Since two or more transmitters powered from the same bias supply may be operated simultaneously, it is necessary to maintain the supply voltage reasonably constant.

j. Overload and Underload Relays. The overload relay, O-1, is designed to prevent the transmitter from damaging itself when there is excessive plate and grid current flow in the final amplifier stage. The overload relay is in the cathode circuit of the final amplifier tubes, V-8 and V-9. During normal operation, not enough current flows to cause the overload relay to operate; but when an excessive current flow occurs, the overload relay is energized and its contacts open. The opening of the overload relay contacts breaks the interlock circuit and causes the interlock relay in the rectifier to open. This

in turn disables the high-voltage rectifier and thus removes the plate voltage from the final amplifier tubes. The underload relay is also in the cathode circuit. When the current flow through V-8 and V-9 falls below a predetermined value, the relay is de-energized and its contacts open. Opening the underload relay contacts breaks a circuit and de-energizes the modulator.

52. Crystal Oscillator (fig. 39)

The oscillator tube, V-1, a pentode tube JAN-6AC7, is used in a Pierce oscillator circuit. The control grid, screen grid, and cathode are used as a triode in the oscillator circuit. The suppressor grid acts as an oscillator output control grid and, with the plate, performs as an oscillator amplifier. In order to obtain the frequency range of the transmitter (2.0 to 26.0 mc), the crystal must oscillate between 2.0 and 6.5 mc. Carrier-frequency outputs

higher than 6.5 mc are obtained by doubling in the plate circuits of the first and third r-f amplifier stages.

a. The plate of the quartz crystal, Y-1, is connected between the control grid (pin 4) and the screen grid (pin 6) of V-1. The grid lead resistor, R-1, provides the correct operating bias for the oscillator circuit. The high resistance of R-2 in the oscillator plate circuit reduces the applied d-c potential to a very low value, thus preventing the crystal from being damaged. The r-f voltage in the grid circuit is very low. When the transmitter is selected for operation by the operator at the remote control station, and when it is not set up for excitation from an external source, the oscillator is in operation in the grid circuit continuously. Capacitors C-41 and C-42 act to standardize the effective capacity in shunt with the crystal.

b. The output of the crystal oscillator is coupled to the plate of V-1 by the

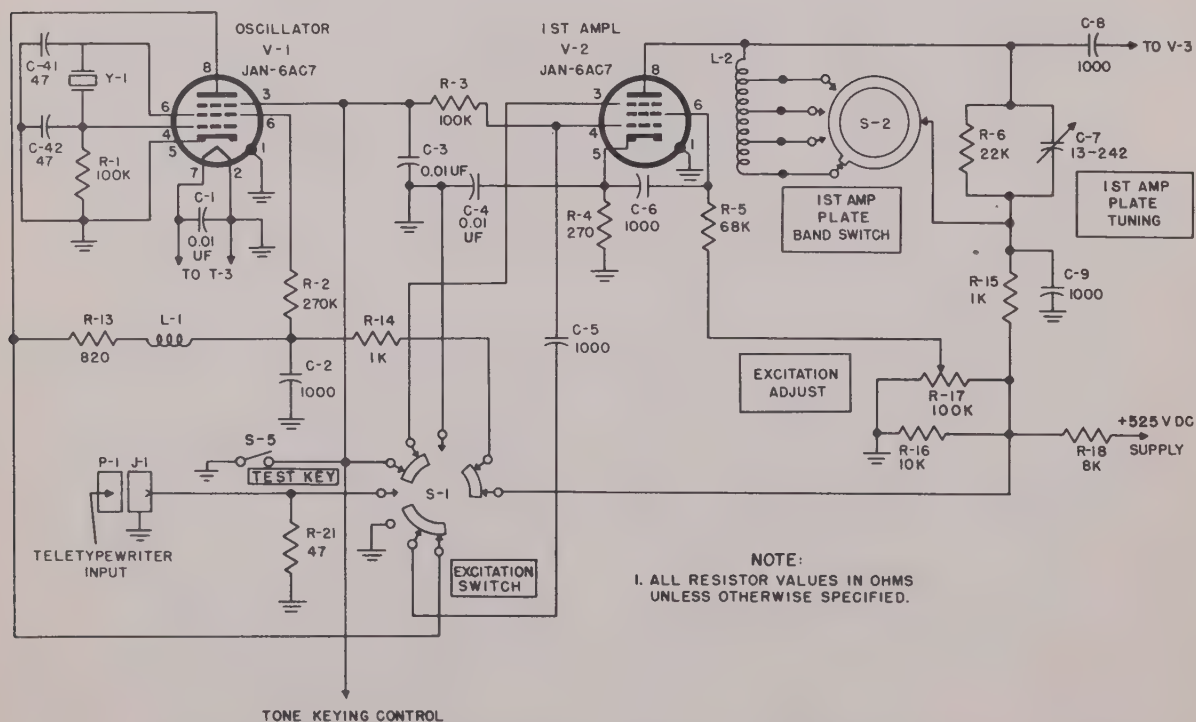


Figure 39. Radio Transmitter Model 96D, simplified schematic diagram of crystal-controlled oscillator and first r-f amplifier stages

electron stream in the tube. To control this electron stream, the suppressor grid is used as a control grid. A high negative d-c potential on the suppressor grid blocks the electron stream, and, as a result, little r-f voltage appears in the plate circuit of V-1. When the suppressor grid is at ground potential, maximum r-f voltage appears in the plate circuit. Control voltage for the suppressor grid is obtained from the tone keying circuit (par. 59). For testing and tuning purposes, a TEST KEY, S-5, is used to place the suppressor grid at ground potential. Resistor R-13 and choke L-1 make up the plate load for V-1 across which the r-f voltage is developed and fed to the control grid of V-2 through capacitor C-5.

c. Capacitor C-1 decouples the r-f voltage from the filament circuit. C-2 provides a return to ground for the r-f current and with R-14 forms a decoupling network. C-3 places the suppressor grid at r-f ground and prevents the tone-keying signal from being shorted to ground. R-3 is the grid return for V-2. The EXCITATION SWITCH, S-1, is used to set up the transmitter for excitation either from the crystal oscillator or from an external source. When switch S-1 is in the INTERNAL position, the plate and screen grid of V-1 are connected to the positive voltage supply, and the r-f output of V-1 is coupled to the grid of V-2 through C-5. If switch S-1 is in the EXTERNAL position, the screen grid and plate of V-1 are disconnected from the positive voltage supply and there is no output from V-1. Also, the grid of V-2 is disconnected from the plate circuit of V-1.

53. First R-f Amplifier (fig. 39)

Tube V-2, a pentode tube JAN-6AC7, is used as a buffer-amplifier-doubler stage between the oscillator and the third r-f amplifier.

a. The control grid of V-2 is connected to the suppressor grid of V-1

through R-3 and is at the same d-c potential as the suppressor grid of V-1. When a high negative potential is applied to the suppressor grid of V-1, it is also applied to the control grid of V-2. Thus, there is no output from V-2. When the control grid of V-2 is at ground d-c potential, V-2 has its maximum gain. Note that when the EXCITATION SWITCH, S-1, is in the INTERNAL position, the suppressor grid of V-2 is at the same d-c potential as the control grid of V-2 and the suppressor grid of V-1. Thus, a high negative d-c potential, which is obtained from the tone keying circuit, completely stops any output from the oscillator and the first r-f amplifier stages. This is the carrier-off or key-up condition of the transmitter.

b. When switch S-1 is in the INTERNAL position, the r-f energy from the plate circuit of V-1 is fed to the control grid of V-2. When switch S-1 is in the EXTERNAL position, r-f voltage from the external exciter is developed across R-21 and coupled to the grid of V-2 by capacitor C-5. Correct operating bias for V-2 is obtained through resistor R-4 in the cathode of V-2, and C-4 is the cathode bypass capacitor for V-2.

c. The plate of V-2 works into a resonant circuit (fig. 39) composed of coil L-2 and variable capacitor C-7. The circuit may be adjusted so that its resonant frequency may be any frequency between 2.0 and 13.0 mc. This frequency range is divided into four major bands as determined by the positions of the 1st AMP PLATE BAND SWITCH, S-2. The switch connects sections of coil L-2 into the circuit so that at the lowest frequency, all of L-2 is in the circuit, and at the highest frequency, the smallest section of L-2 is in the circuit. Any frequency within each band is obtained by the adjustment of the 1st AMP PLATE TUNING capacitor, C-7. When a frequency higher than 6.5 mc is desired, frequency doubling takes place in this tank circuit. The circuit is tuned to twice the input frequency,

or actually to the second harmonic of the input frequency. Resistor R-6 is connected in parallel with capacitor C-7 to act as a damping resistor. Plate voltage for V-2 is supplied through the resonant circuit from the voltage-dividing network consisting of resistors R-16 and R-18. This network is across the low-voltage plate supply. The EXCITATION ADJUST potentiometer, R-17, controls the gain of the stage by control of the screen grid voltage of V-2. Resistor R-5 limits the current flow in the screen grid circuit to a safe value, and C-6 provides a path for r-f energy from the screen grid to the cathode of tube V-2. Resistor R-15 and C-9 form a filter network to remove the r-f energy in the plate supply line. Capacitor C-8 couples the r-f energy in the plate circuit of V-2 to the control grid of V-3.

54. Second R-f Amplifier (fig. 40)

Tube V-3, a beam-power amplifier JAN-807, is used to amplify the output of the first r-f amplifier stage.

a. R-f energy from the plate circuit of V-2 is coupled through capacitor C-8 to the control grid of V-3, and appears across grid resistor R-7. Grid bias is supplied from the -450-volt power supply bleeder network at the junction of R-23 and R-47. This biases the tube to nearly cut-off with no signal applied. The grid bias also keeps the plate current flow within safe operating limits in order to protect the tube. The r-f voltage applied to the control grid is, on positive peaks, large enough to overcome the grid bias and cause current to flow in the grid circuit. The amount of grid current flow depends

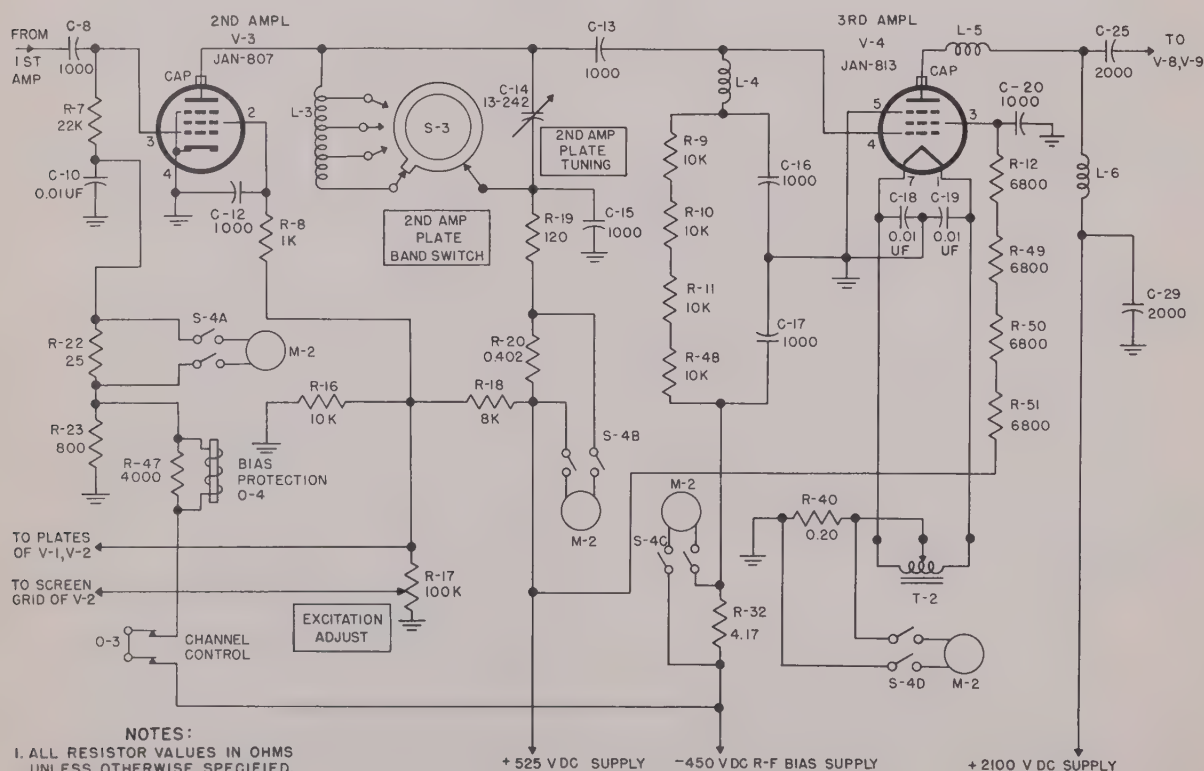


Figure 40. Radio Transmitter Model 96D, simplified schematic diagram of second and third r-f amplifier stages

upon the setting of the EXCITATION ADJUST control (R-17). This grid current is metered by placing meter M-2 across R-22. Capacitor C-10 bypasses the r-f energy to ground in order to keep it out of the -450-volt supply. The cathode of tube V-3 is connected directly to ground.

b. The screen grid voltage for V-3 is obtained from the 525-volt supply voltage-dividing network consisting of R-16 and R-18. Capacitor C-12 and resistor R-8 form a filter decoupling network for the screen grid.

c. The plate circuit of the second r-f amplifier consists of coil L-3, capacitors C-13, C-14, and C-15, resistors R-19 and R-20, and switch S-3. Coil L-3 and capacitor C-14 constitute a resonant circuit. Coil L-3 is tapped in four places; thus the resonant frequency of the circuit is divided into four major bands. The 2ND AMP PLATE BAND SWITCH, S-3, connects the coil taps, one at a time, into the circuit. The 2ND AMP PLATE TUNING control, C-14, is a variable capacitor and tunes the tank circuit to any frequency within a major band. Capacitor C-13 couples the r-f energy in the plate circuit of V-3 to the input circuit of V-4. Plate voltage for V-3 is furnished by the 525-volt supply through resistors R-19 and R-20. R-19 is a decoupling resistor. R-20 is a precision resistor used as a shunt for meter M-2 to indicate the plate current of V-3. Capacitor C-15 bypasses the r-f energy to ground in order to keep it out of the 525-volt supply.

55. Third R-f Amplifier (fig. 40)

Tube V-4, a beam-power amplifier Tube JAN-813, is used as an r-f amplifier doubler. In this stage, the r-f plate circuit of V-4 is also the input circuit of the final amplifier stage (par. 56).

a. R-f energy from the plate circuit

of V-3 is coupled by capacitor C-13 to the control grid circuit of V-4. Choke L-4, resistors R-9, R-10, R-11, and R-48, and capacitors C-16 and C-17 are all part of the grid circuit. Tube V-4 is biased to cut-off, when no signal is applied to the grid, by the -450-volt bias supply. The r-f voltage across choke L-4 is, on positive peaks, great enough to drive the grid positive, causing it to draw grid current. This grid current passes through the grid circuit and through precision resistor R-32. Meter M-2 is placed across R-32 by means of the METER SWITCH, S-4, when it is necessary to measure the grid current. Resistors R-9, R-10, R-11, and R-48 are the grid leak resistors. Capacitor C-16 bypasses the r-f energy in the grid network to ground, and C-17 bypasses any r-f energy in the bias supply line to ground.

b. Tube V-4 is the filament type. The filament power supply transformer, T-2, is center-tapped, and this tap is returned through precision resistor R-40 to ground. In order to prevent stray radio frequency voltages from developing in the filament, the filament lines are bypassed to r-f ground by capacitors C-18 and C-19. The current flow in tube V-4 is measured by connecting across resistor R-40. Meter M-2 is connected across R-40 by means of meter switch S-4. The screen grid of V-4 is connected to the 525-volt supply through dropping resistors R-12, R-49, R-50, and R-51. Capacitor C-20 bypasses the screen grid to r-f ground.

c. The plate circuit of V-4 consists of chokes L-5 and L-6 and capacitors C-25 and C-29. These components are mounted on the slide (fig. 28), although tube V-4 is mounted on the exciter chassis. The plate of V-4 is connected to the 2,100-volt plate supply through chokes L-5 and L-6. L-5 is used to prevent the generation of spurious oscillations. L-6 is a high-impedance choke which furnishes a path for d-c power to the plate. R-f energy is coupled to the input circuit of the final

rent flow is in such direction as to tend to increase the bias supply voltage to the value of the rectified voltage appearing across C-40. A bias isolation circuit, described in paragraph 60 serves to minimize this bias voltage increase.

b. Tubes V-8 and V-9 are the filament type. The filaments are bypassed to r-f ground by capacitors C-31, C-32, C-33, and C-34. The secondary winding of filament transformer T-4 is center-tapped. This center tap is connected through the overload and underload networks and meter M-1 to ground. This circuit is the cathode return. Meter M-1 measures the total current flow through the final amplifier stage. The overload network consists of relay 0-1 and variable resistor R-42. Resistor R-42 is the OVERLOAD ADJUST control. Its setting determines the maximum value to which the current can rise before the overload relay will operate. The underload network consists of variable resistor R-43 and underload relay 0-2. Resistor R-43 is the UNDERLOAD ADJUST control. Its setting determines the lowest value to which the current can fall before the underload relay will operate.

c. The plates of V-8 and V-9 are connected in parallel. The plate voltage for the final amplifier tubes is either modulated or unmodulated 4,200 volts, depending upon the type of operation for which the transmitter is being used. The parallel plates of V-8 and V-9 are connected to the power supply through high-impedance choke L-9. Capacitor C-30 bypasses any r-f energy to ground. Modulation of the output of the final amplifier tubes is accomplished by means of a modulated plate voltage. Thus, the amplitude of the amplified r-f voltage is varied by the modulated plate voltage, and this modulated r-f voltage is coupled to the plate circuit of the final amplifier by capacitor C-35.

d. The plate circuit of the final ampli-

fier consists of variable capacitor C-36 and coil L-10. Two fixed capacitors, C-37 and C-38, are installed in the plate circuit in series or parallel with C-36, depending upon the frequency at which the transmitter is operating. At low frequencies, C-37 and C-38 are in parallel with C-36, and at high frequencies, one or both may be in series with C-36. In the middle band of the frequency range, both C-37 and C-38 are out of the circuit. Connections for arranging these two capacitors for the different bands are made by an L-shaped jumper and fuse clips. The arrangement of capacitors C-37 and C-38 is discussed in detail in table I (par. 31). Capacitor C-36, the FINAL AMP PLATE tuning control, is a variable vacuum-type capacitor. Coil L-10 is a tapped coil, constructed so that the number of turns in the circuit can be varied, depending upon the frequency at which the transmitter is operating. The arrangement of the taps is given in table I (par. 31). Capacitor C-36 and coil L-10, when properly tuned, form a resonant circuit with r-f current circulating within it.

e. Energy is coupled from the final amplifier plate circuit by ANTENNA COUPLING coil L-11. L-11 is a variable unit, and its position within L-10 determines how much energy is fed to the antenna. Capacitor C-39, the ANTENNA TUNING control, tunes the antenna network so that maximum energy will be radiated from it. C-39 is a variable two-section capacitor that is used with either balanced or unbalanced antennas. The output impedance of the antenna network is 500 to 600 ohms. Resistors R-52 and R-53 drain off currents due to static charges on the antenna.

57. Neutralization (fig. 42)

The purpose of neutralization is to cancel the current which is fed back to the grid circuit of the final amplifier by the grid-to-plate capacitance of tubes V-8 and V-9, thereby preventing the final

amplifier stage from oscillating. The system used for this purpose is essentially a bridge circuit. This bridge circuit balances the current fed back by the grid-to-plate capacitance of V-8 and V-9 by an equal, but opposing, current fed back through neutralizing capacitor C-27. The NEUTRALIZING CONTROL, C-27, is a variable capacitor of the dash-pot type.

a. Figure 42 shows the r-f paths entering into the neutralizing process. The r-f energy from the third amplifier is impressed across coil L-7 and variable capacitor C-26. Coil L-7 is center-tapped and is effectively at r-f ground potential at the center tap. Capacitor C-26 is a two-section unit, and one set of plates in each unit is at ground potential. The voltage across section AB of L-7 and C-26 is fed to the grids of V-8 and V-9 to be amplified. The amplified voltage appearing across L-9 causes r-f current to flow in capacitors C-35 and C-27 and section BC of L-7 and C-26. The current through section BC of L-7 induces a voltage opposite in phase to the voltage in section AB of L-7 caused by the current flow through the grid-to-plate

capacitance of V-8 and V-9. Thus, when C-27 is properly adjusted, the two opposing voltages cancel, and no feedback voltage appears across terminals AB.

b. It is important to note that sections AB and BC of L-7 are sections of the same coil and that an r-f current in section BC induces a voltage in section AB because of the mutual induction of the two sections. The induced voltage is the opposing voltage discussed above. The effect of capacitor C-35 on the neutralizing circuit has not been mentioned in the above discussion; however, the capacitance of C-35 is high so that the net capacitance of C-35 and C-27 in series is nearly equal to that of C-27 alone. The adjustment of C-27 is made so that the total capacitance of grid-to-plate capacities of V-8 and V-9 is approximately equal to the capacitance of C-27 in series with C-35. The method of securing complete neutralization is given in paragraph 32.

58. Tone Keying Control (fig. 43)

Tube V-5, a twin triode Tube JAN-6SN7GT, is used as the keying control tube. In the key-up or carrier-off condition, the second section of V-5 develops a high negative potential at the junction of R-26 and R-27. This negative potential is applied to the suppressor grid of V-1 and the control grid and suppressor grid of V-2, effectively cutting them off (pars. 52 and 53). The two triode sections of V-5 are connected as a direct-coupled amplifier. A signal applied to the grid of the input section appears greatly amplified in the plate circuit of the output section.

a. Step-up transformer T-1 is inserted between the keying line and the input section of V-5. Potentiometer R-24, the TONE KEYING GAIN CONTROL, is connected across the secondary of T-1 and provides for manual adjustment of the signal applied to the input grid. Capacitor C-11 is inserted

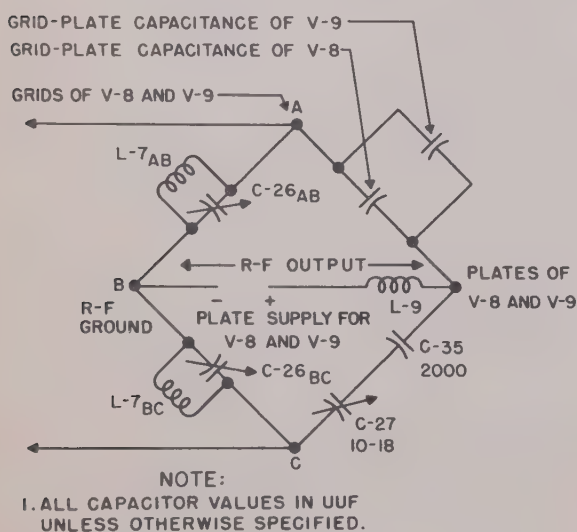


Figure 42. Radio Transmitter Model 96D, functional diagram of neutralizing circuit

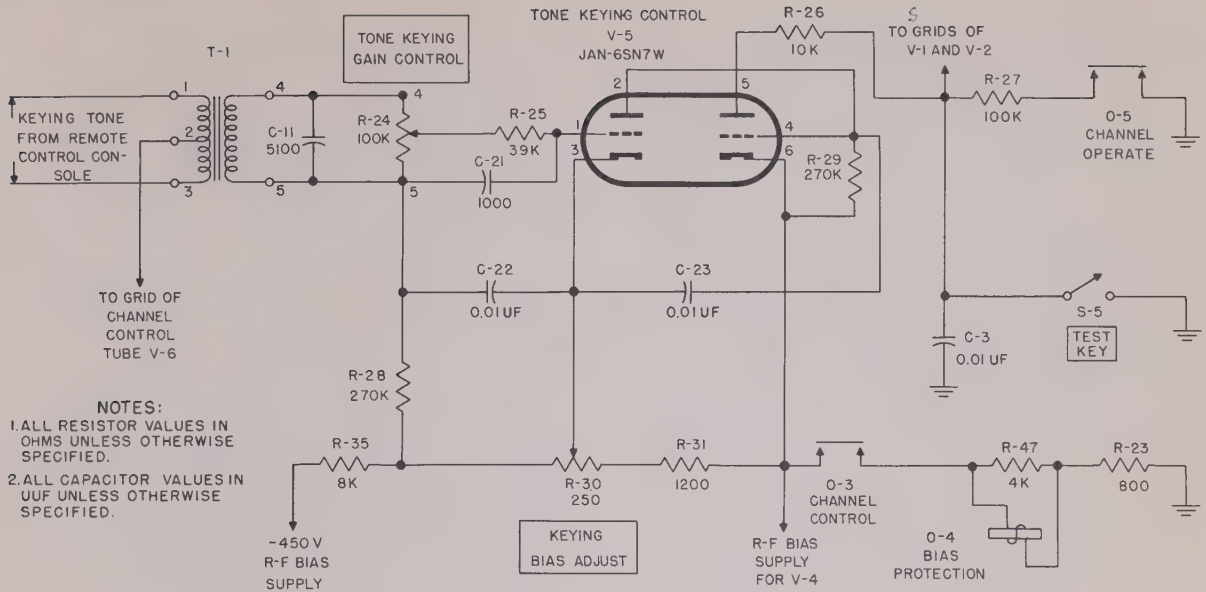


Figure 43. Radio Transmitter Model 96D, simplified schematic diagram of tone keying control circuit

across the secondary of T-1 to eliminate keying by spurious signals. The grid bias for the input section of V-5 is taken from the -450-volt supply through the tap on KEYING BIAS ADJUST potentiometer R-30 and is adjusted for approximately plate current cut-off with no signal applied to the input grid. A signal applied to the input grid from T-1 will, on positive peaks, cause the first section of V-5 to conduct, thus resulting in a voltage drop across plate load resistor R-29. Plate potential is secured through R-29 from the -450-volt bias supply bleeder. R-28 and a portion of R-24 are all part of the grid return circuit. Capacitor C-21 and resistor R-25 form a low-pass filter and keep r-f voltage from the grid.

b. The grid of the second section of the triode is connected directly to the plate of the first section, and the cathode is connected to the other end of resistor R-29. The negative cathode potential is obtained from the bias supply bleeder by means of the voltage drop across R-23 and the voltage drop across the coil of relay 0-4 and resistor R-47. Plate return is through R-26 and R-27.

Under key-up or carrier-off conditions, there is no drop across R-29. The cathode and grid of the second section are then at the same negative potential, and the plate is at ground potential. Maximum plate current will then flow through R-26 and R-27 since there is no bias. The negative voltage drop across R-27 is then applied to the controlling grids of V-1 and V-2 and prevents the oscillator voltage from being amplified by these tubes.

c. A signal applied to the input grid of V-5 from T-1 causes a voltage drop across R-29. This places a large negative voltage on the grid of the second section of V-5. Plate current ceases to flow in this section of the triode, and there is no voltage drop across R-27. In this condition, the controlling grids of V-1 and V-2 are at ground potential and tubes V-1 and V-2 perform their functions. Capacitor C-3 is across R-27, and C-23 is across R-29, R-30, and R-31 in order to introduce a time constant to prevent the voltage drop across R-27 from following the a-c signal applied to the grid of the input section. R-26 prevents excessive plate dissipation.

pation in the second section of V-5, when the TEST KEY, S-5, is operated.

d. The minimum frequency at which the keying circuit will produce a constant carrier output for the key-down or carrier-on conditions is determined by the time constants of the circuit. This minimum frequency is approximately 200 cps (cycles per second). Local operation of the transmitter is obtained by means of TEST KEY S-5 on the control panel. This connects the controlling grids of V-1 and V-2 directly to ground.

59. Electronic Channel Control (fig. 44)

Tube V-6, a triode Tube JAN-6J5, is used for channel control. The plate circuit of V-6 operates into the coil of 0-3, the channel control relay, and three resistors, R-44, R-45, and R-46. Relay 0-3 controls the operation of the other relays, 0-4 and 0-5. The operation of the relays is given in paragraph 61.

a. Tube V-6 is normally biased to plate current cut-off by means of vol-

tage divider R-34 and R-33 across the -450-volt bias supply. The grid of V-6 is connected to a center tap on the primary of T-1, the keying transformer. When the transmitter is selected for use, the simplex circuit of the keying lines is grounded by means of a remotely located control unit. This lowers the bias on the grid of V-6 and permits plate current to flow in the tube and coil of relay 0-3, thus causing the relay contacts to close.

b. R-36 determines the sensitivity of the circuit, and capacitor C-24 prevents rf from triggering the channel control tube. R-37 is the cathode bias resistor. Plate potential is supplied from the 525-volt supply through R-44, R-45, and R-46 and the coil of 0-3. R-44, R-45, and R-46 prevent excessive plate current through the tube and excessive current through 0-3 when the grid of V-6 is grounded. Switch S-6, the CHANNEL CONTROL, mounted on the control panel is used during the tuning procedure and for testing purposes. This switch, when closed, puts the grid of V-6 at ground potential and allows V-6 to conduct.

60. Bias Isolator (fig. 45)

Bias isolator tube V-7, a triode Tube JAN-811, is connected into the grid return circuit of final amplifier tubes V-8 and V-9 to prevent current flow in the grids of the final amplifier tubes from causing an appreciable change in the r-f bias supply voltage. If such a change were permitted, the bias on the tubes in the exciter would vary, as well as the bias on other r-f units connecting to the same bias supply, thus causing erratic performance.

a. When an r-f voltage is applied to the grids of the tubes in the final amplifier from the plate circuit of third amplifier V-4, grid current flows on the positive peaks and rectification occurs. The -450-volt bias supply is connected to the grid of the bias isolator

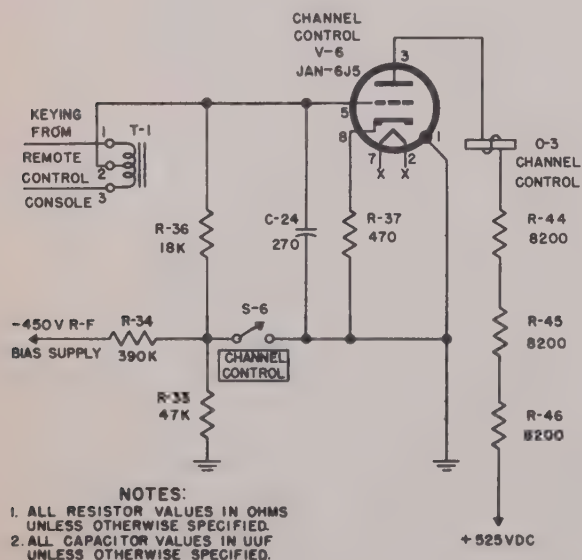


Figure 44. Radio Transmitter Model 96D, simplified schematic diagram of electronic channel control circuit

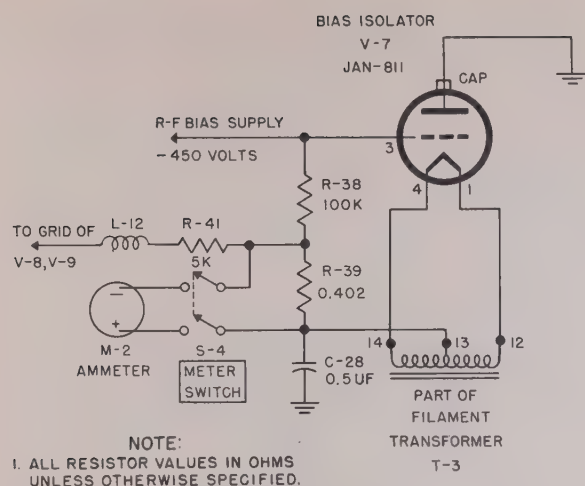


Figure 45. Radio Transmitter Model 96D, simplified schematic diagram of bias isolation circuit

tube and to the cathode of the same tube through grid resistor R-38, precision resistor R-39, and the center tap on the filament winding of T-3. The plate of V-7 is connected directly to ground.

b. When the transmitter is in the static or key-up condition, a small voltage drop occurs across R-38 which biases V-7 very nearly to cut-off. Since the drop across R-38 is small, the d-c bias voltage of the filament of V-7 will not be greatly different from the grid voltage of V-7. This potential is applied to the grids of V-8 and V-9 through grid leak resistor R-41 and the grid circuit of the final amplifier. In the dynamic or key-down condition of the transmitter, the grids of V-8 and V-9 draw current through R-41 and R-38. The voltage drop across resistor R-38 resulting from the flow of grid current in the final amplifier opposes the voltage drop produced in the static condition. This causes V-7 to conduct heavily.

c. The filament cathode of V-7 is negative with respect to the plate, and the current flow from the grids of V-8 and V-9 is passed through the plate circuit of bias isolator tube V-7. The cathode-to-plate impedance of V-7 is much lower than the impedance of R-38 and

therefore the greater part of the current flows through the plate circuit. The plate impedance of V-7 becomes part of the grid leak circuit of V-8 and V-9 and determines the bias applied to their grids.

d. To measure the final amplifier grid current, a precision resistor, R-39, is connected in the grid return circuit between R-41 and the center tap on T-3. In the FINAL AMP GRID position of METER SWITCH S-4, meter M-2 is connected across R-39 and measures the grid current flow in the final amplifier. Capacitor C-28 bypasses any l-f (low-frequency) disturbances that may exist in the bias circuit to ground to prevent them from affecting the bias on the final amplifier tubes.

61. Bias Protection (fig. 46)

Figure 46 is a simplified schematic diagram of the bias protection circuit and shows the position of the relays when the transmitter is keyed.

a. The control grid of V-6 is then at ground potential, and V-6 is conducting. The plate current of V-6 flows through the coil of channel control relay 0-3 and energizes it, causing its contacts to close. This connects the coil of bias protection relay 0-4 to the -450-volt r-f bias supply, and the contacts of 0-4 close. When 0-4 closes, the coil of 0-5, the channel operate relay, is connected across the 220-volt a-c power line. Thus, 0-5 is energized and closes its contacts. The contacts of 0-5 connect the following: the primaries of filament transformers T-2 and T-4 and the blower motor, B-1, to the 220-volt a-c supply; the plates and screen grids of V-1, V-2, and V-3 and the screen grid of V-4 to the 525-volt supply; and the plate circuit of V-5 to ground.

b. If the -450-volt bias supply should fail, relay 0-4 would be de-energized and its contacts would open. This would break the circuit for the coil of 0-5,

a. When the knob is pulled all the way out, all the d-c lines within the transmitter are grounded. This discharges components such as high-voltage capacitors which may hold a charge unless they are discharged. This provides protection for personnel who may have to perform work within the transmitter cabinet.

b. Within the switch box are two separate switches, S-10 and S-11, which are operated by the same control as the high-voltage switch. These two switches are part of the interlock circuit and function as follows: when the control handle is pulled out, switch S-10 is opened and the interlock circuit is broken momentarily, for S-11 then closes and completes the interlock circuit again. This bypasses the transmitter but completes the external interlock circuit so that the remaining units may continue in operation. After the high-voltage switch is pulled out, the transmitter may be opened for inspection and service.

Caution: Do not depend upon the high-voltage switch to discharge the high-voltage capacitors. Always ground out all the high-voltage capacitors with a shorting stick before proceeding with maintenance.

63. Overload And Underload Protection (fig. 41)

The coils of the overload and underload relays form part of the common cathode circuit of the final amplifier tubes.

a. The coil of the overload relay, 0-1, is shunted by variable resistor R-42, the OVERLOAD ADJUST control. R-42 is adjusted so that a current flow greater than 1 ampere will cause the overload relay to operate. When the overload relay operates, it opens the interlock circuit. This causes the interlock relay in the rectifier to open and causes the positive high- and low-

voltage rectifiers to stop operation (par. 66c). Once the plate voltage for the final amplifier stage is interrupted, the current flow in the cathode circuit stops and relay 0-1 becomes de-energized and the interlock circuit is again completed. The interlock relay in the rectifier closes, and the positive high- and low-voltage rectifiers start functioning. If the final amplifier still draws too much current, the overload relay will be energized and the whole chain of events will take place again. Thus, until the cause of the excessive current is removed, the overload relay will keep cycling, thereby preventing damage to the final amplifier stage.

b. The coil of the underload relay, 0-2, is shunted by variable resistor R-43, the UNDERLOAD ADJUST control. R-43 is adjusted so that a current flow of less than 0.50 ampere will cause the relay to become de-energized, thus opening its contacts. When the contacts open, a circuit which controls a relay in the associated modulator is opened. This causes the modulator to stop furnishing modulated plate voltage to the transmitter. Until the cause of the underload is removed, the modulator cannot be operated.

c. The procedure for adjusting OVERLOAD ADJUST control R-42 and UNDERLOAD ADJUST control R-43 is given in paragraph 33.

SECTION II. RECTIFIER POWER UNIT MODEL 36D

64. Block Diagram of Rectifier Power Unit Model 36D (fig. 48)

The rectifier power unit consists of four separate rectifier power supplies, a high-voltage switching unit, and the necessary relays and switches needed

d. High-Voltage Rectifier. The h-v rectifier consists of six Tubes JAN-4-B32, four filament transformers, two filter chokes, two filter capacitors, three bleeder resistors, and a h-v plate supply transformer. All the components except the bleeder resistors and the h-v transformer are mounted on the h-v rectifier chassis. The h-v transformer is mounted in the bottom of the rectifier cabinet. The h-v rectifier is a bridge-type full-wave rectifier with outputs of 4,200 volts dc at 3 amperes, either filtered or unfiltered, and 2,100 volts dc at 0.5 ampere, filtered. The unfiltered 4,200-volt supply is used in the transmitter as the plate voltage for tubes V-8 and V-9 for c-w operation. The filtered 4,200-volt supply is used in the transmitter as the plate voltage for tubes V-8 and V-9 when the transmitter is being used for carrier-shift teletypewriter operation and for plate voltage for the modulator power amplifier tubes. The 2,100-volt supply is used in the transmitter as plate supply for the third r-f amplifier tube, V-4, and for the final amplifier during the tuning procedure.

e. High-Voltage Switching Unit. The high-voltage switching unit consists of 10 relays mounted on a separate chassis. The unit is used to connect one to five transmitters to the unfiltered 4,200-volt supply or the modulated 4,200-volt supply from the modulator. Operation of the individual relays within the switching unit is controlled from the remote control console. When a transmitter is not selected for use by the operator at the remote control console, the switching unit connects the transmitter to the unfiltered 4,200-volt supply.

f. Power and Interlock Relay System. The power and interlock relay system is designed to start and stop the unit, either locally or remotely, and to provide protection for the equipment and operating and maintenance personnel. A time-delay relay prevents application of high voltage to the tubes in the h-v rectifier and l-v plate supply rectifier until the tubes have heated sufficiently

for safe operation. The interlock system, which includes the interlock relay in the rectifier, the interlock switches in the rectifier and associated transmitters and modulators, and the overload relay contacts in the transmitters and modulator, causes the high-voltage and low-voltage plate supply rectifiers to stop operation when it is opened.

g. Meters. Four voltmeters, mounted at the top front of the rectifier unit, are provided to give a visual indication of the operation of the rectifier unit. One meter, AC LINE, indicates the voltage of the input power; the RF BIAS meter indicates the output voltage of the r-f bias supply rectifier; the LOW RF PLATE meter indicates the output voltage of the l-v plate supply rectifier; and the FINAL PLATE meter indicates the output voltage of the h-v rectifier.

65. Stage Analysis of Rectifier Power Unit Model 36D

a. General. The 12-volt rectifier, the r-f bias supply rectifier, and the low-voltage plate supply rectifier are all mounted on one chassis. The high-voltage rectifier with the exception of the high-voltage power transformer is mounted on another chassis. The high-voltage rectifier power transformer is mounted in the base of the rectifier unit. The high-voltage switching unit is one chassis and is mounted to the side of the rectifier unit. The meters, switches, fuses, and relays are mounted on panels which are secured to the rectifier unit.

b. 12-Volt Supply Rectifier (fig. 49). The 12-volt rectifier, CR-1, is a full-wave, bridge-type, magnesium-copper-sulphide, dry-metallic rectifier. The dry rectifier operates on the principle that when an oxide film is present, it has a high resistance to current flow in one direction and a very low resistance to current flow in the opposite direction. Thus, the net current over each complete cycle flows only in one direction and rectification occurs. Rectifier CR-1 is composed of four units connected in

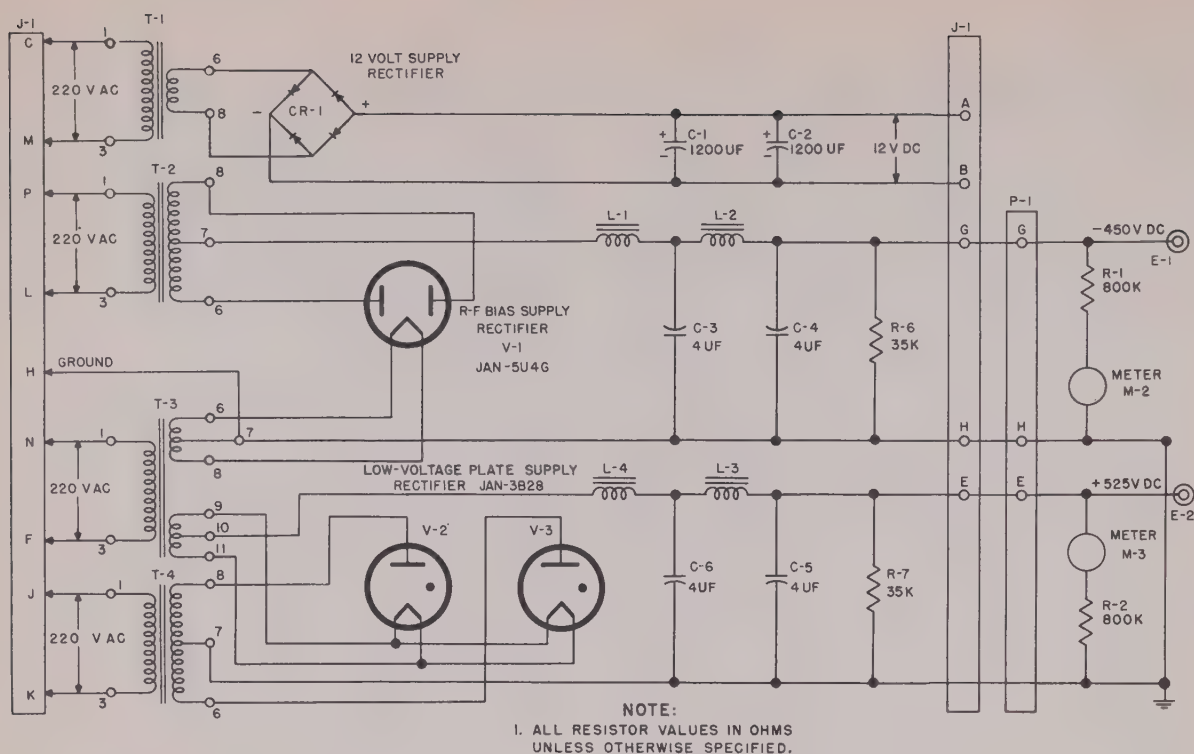


Figure 49. Rectifier Power Unit Model 36D, simplified schematic diagram of low-voltage rectifier assembly

a bridge-type circuit as shown in figure 49. Note that the electron flow is in the direction to which the arrowheads point. Transformer T-1 reduces the 220 volts ac in the primary to approximately 16 volts ac in the secondary. This secondary voltage is applied across rectifier CR-1, and the rectified d-c power is developed across another set of terminals of CR-1. These connections are shown clearly in figure 49. The output is nominally 12 volts dc at 4 amperes. Capacitors C-1 and C-2 are very large and are used for filtering the output of the rectifier.

c. Low-Voltage Plate Supply Rectifier (fig. 49). The low-voltage plate supply rectifier consists of two rectifier Tubes JAN-3B28, V-2 and V-3, with their plates connected across the secondary of transformer T-4 for full-wave rectification. The filaments of the tubes are connected in parallel across a secondary winding of transformer T-3. The secondary of T-4 is center-tapped and connected at this point

to ground. The filament winding for the tubes is also center-tapped and connected to the choke input filter circuit. The primary windings of T-3 and T-4 have several taps on them in order to obtain correct voltage output from the secondary windings when the input voltage varies from normal. The choke input filter consists of two chokes, L-3 and L-4, and two capacitors, C-5 and C-6. Bleeder resistor R-7 is connected between the supply line and ground and discharges the filter capacitors when the equipment is shut down. Resistor R-2 is meter multiplier for M-3. Meter M-3 measures the output of the 525-volt d-c supply. The output of the circuit is 0.45 ampere at 525 volts dc.

d. R-F Bias Supply Rectifier (fig. 49). The r-f bias supply rectifier consists of a high-vacuum tube V-1, Tube JAN-5U4G, whose plates are connected across the secondary of plate supply transformer T-2 for full-wave rectification. The filament of V-1 is con-

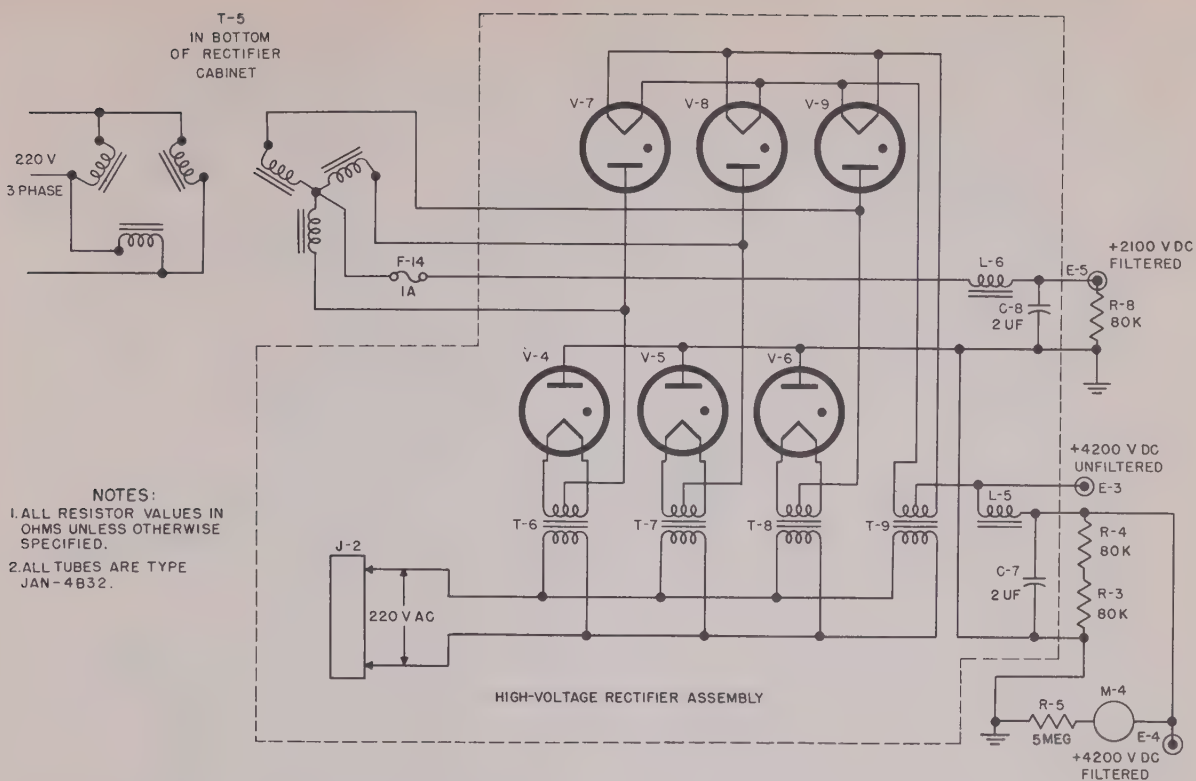


Figure 50. Rectifier Power Unit Model 36D, simplified schematic diagram of high-voltage rectifier

ected to a filament winding on T-3, and this winding is center-tapped and connected to ground. The secondary winding of T-2 is center-tapped and connected to the input side of the choke input filter circuit. The primary windings of T-2 and T-3 have taps where connection can be made in order to correct for variations in line voltage. The choke input filter consists of two chokes, L-1 and L-2, and two capacitors, C-3 and C-4. This filter eliminates most of the a-c ripple present in the output of the rectifier. Bleeder resistor R-6 is connected between the supply line and ground and discharges C-3 and C-4 when the equipment is shut down. The filter is capable of delivering 0.225 ampere at -450 volts dc. Resistor R-1 is a meter multiplier for M-2. Meter M-2 measures the output of the -450-volt d-c supply.

e. High-Voltage Rectifier (fig. 50).
Six Tubes JAN-4B32 are used in a bridge-type full-wave rectifier. These

tubes, V-4, V-5, V-6, V-7, V-8, and V-9, have large current and voltage ratings. Three different outputs are obtained from the high-voltage rectifier, namely: 4,200 volts dc, unfiltered; 4,200 volts dc, filtered; and 2,100 volts dc, filtered. The h-v power transformer, T-5, has a delta-wound, 220-volt a-c primary with taps and a star-wound secondary winding. The taps on the primary permit the adjustment of the transformer to the supply line voltage. The 4,200-volt outputs are obtained by using all six tubes. The 2,100-volt output is obtained through V-4, V-5, and V-6 only. Four filament transformers, T-6, T-7, T-8, and T-9, with the secondary winding of each transformer center-tapped, are used. T-6 supplies V-4, T-7 supplies V-5, T-8 supplies V-6, and T-9 supplies V-7, V-8, and V-9. The center tap of T-6 is connected to a winding on the secondary of T-5 and the plate of V-7; likewise, the center tap of T-7 is connected to another winding on the second-

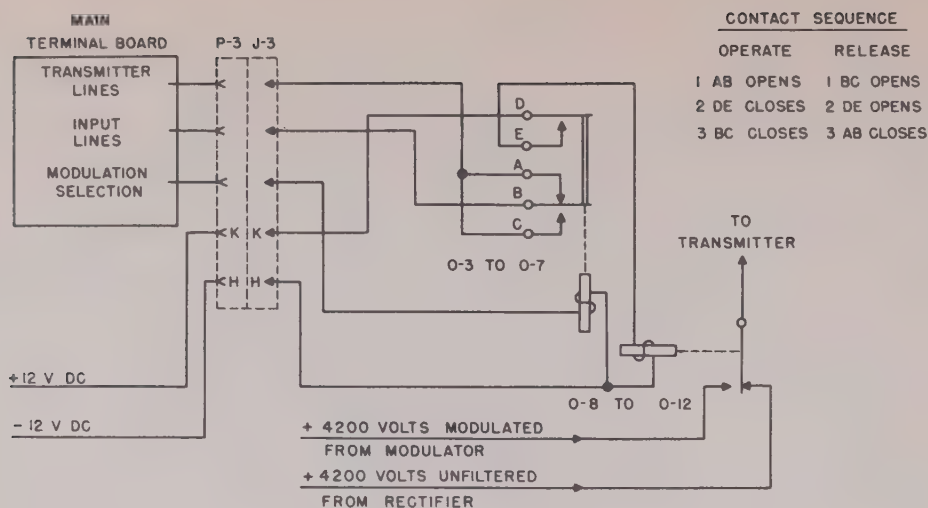


Figure 51. Rectifier Power Unit Model 36D, simplified schematic diagram of high-voltage switching unit

dary of T-5 and the plate of V-8, and the center tap of T-8 is connected to the remaining winding on the secondary of T-5 and the plate of V-9. The common point of the three secondary windings of T-5 is used to furnish the 2,100-volt plate supply and is connected to the choke input filter. The plates of V-4, V-5, and V-6 are connected directly to ground and these tubes operate as a half-wave rectifier for the 2,100-volt supply. The center tap of T-9 is used as the positive side of the 4,200-volt supply. Since the plates of V-4, V-5, and V-6 are grounded, and the plates of V-7, V-8, and V-9 are connected to the windings on T-5 and the cathodes of V-4, V-5, and V-6, full-wave rectification of the three-phase power is obtained (fig. 50). Choke L-5 and capacitor C-7 form a filter network for the 4,200-volt supply. Resistors R-3 and R-4 are bleeder resistors that discharge C-7 when equipment is shut down. A connection is made between the center tap of T-9 and choke L-5 to furnish the unfiltered 4,200-volt supply. The full-wave rectifier is capable of supplying 3 amperes at 4,200 volts dc. Choke L-6 and capacitor C-8 form a filter network for the 2,100-volt supply. Resistor R-8 is connected between the 2,100-volt line and ground and discharges C-8 when the equipment is shut down. Resistor R-5 is a meter multi-

plier for M-4. Meter M-4 measures the output voltage of the 4,200-volt d-c filtered supply.

f. High-Voltage Switching Unit (fig. 51). The high-voltage switching unit contains 10 relays, 0-3 through 0-12. These relays are divided into two banks of five each. One bank, transmitter disabling relays 0-3 through 0-7, controls the operation of the other bank, high-voltage switching relays 0-8 through 0-12. The operation of relays 0-3 through 0-7 is controlled from a remote control unit, such as Remote Control Console Type CS-212. When a particular transmitter is selected for use by the operator at the remote control station, the coil of one of the relays (0-3 through 0-7) is energized. The sequence of relay operation (fig. 51) is as follows: When the relay (0-3 through 0-7) is energized, contacts AB open, thus opening the transmitter keying line. Contacts DE close, connecting the coil of the high-voltage switching relay (0-8 through 0-12) to the 12-volt supply. When the high-voltage switching relay operates, the transmitter is disconnected from the 4,200-volt unfiltered d-c supply and connected to the 4,200-volt modulated supply. Contacts BC of the transmitter disabling relay close, reconnecting the transmitter to the keying line. Thus, relay 0-3 con-

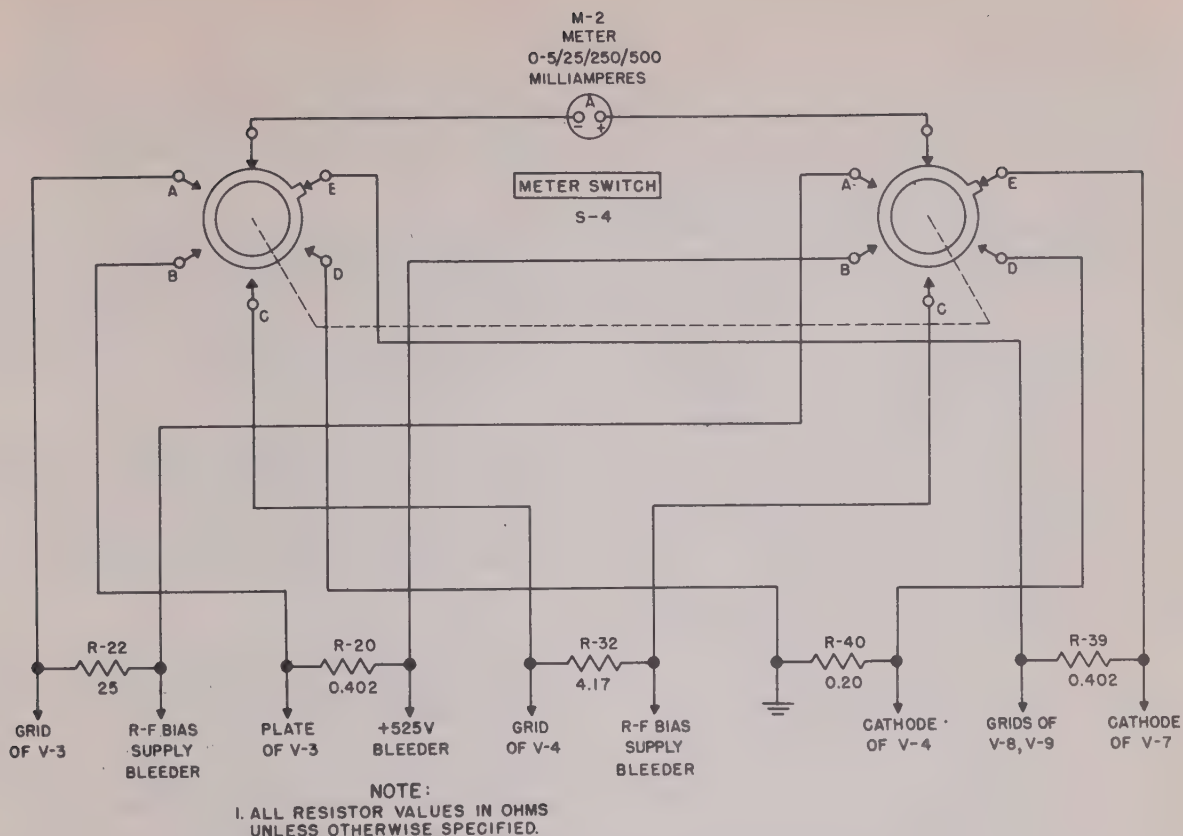


Figure 52. Radio Transmitter Model 96D, simplified schematic diagram of multiscale meter circuit

controls 0-8, relay 0-4 controls 0-9, relay 0-5 controls 0-10, relay 0-6 controls 0-11, and relay 0-7 controls 0-12. When the modulated channel is released, the circuit to the coil of a particular transmitter disabling relay is opened and the relay sequence is the reverse of that outlined above. The transmitter is disconnected from the modulated 4,200-volt supply and connected to the unfiltered 4,200-volt supply.

66. Metering and Control Circuits

a. Radio Transmitter Model 96D. Since most of the metering and control circuits are functioning parts of the transmitter electronic circuits, they are discussed in paragraphs 52 through 63.

(1) Multiscale Ammeter (fig. 52). Multiscale ammeter M-2 is connected into five different circuits, one at a time, by the METER SWITCH, S-4. S-4 is a six-position, two-pole, wafer-

type switch. Each position of the switch is labeled; reading clockwise, the positions are as follows: OFF, 2ND AMP GRID, 2ND AMP PLATE, 3RD AMP GRID, 3RD AMP TOTAL, and FINAL AMP GRID. Figure 52 is a simplified schematic diagram of the circuits involved in the metering circuits. For ease in understanding, the positions have been labeled A, B, C, D, and E. When the switch contacts are at A-A, the meter is connected across precision resistor R-22. R-22 is in the grid circuit of the second r-f amplifier; thus, M-2 measures the current flow in R-22, which is the grid current flow for V-3. In position B-B, Meter M-2 is across precision resistor R-20 and measures the current flow which is the plate current of V-3, the second r-f amplifier. In position C-C, M-2 is across precision resistor R-32. R-32 is in the grid circuit of V-4, the third r-f amplifier; thus, M-2 measures the current flow through R-32, which is the

grid current of V-4. When S-4 is in position D-D, M-2 is connected across precision resistor R-40, which is in the third amplifier cathode circuit. Thus, M-2 measures the current flow through R-40, which is the third amplifier total current. In figure 52, S-4 is shown in position E-E. Meter M-2 is connected across precision resistor R-39, which is in the grid circuit of the final amplifier tubes; thus, M-2 measures the grid current of the final amplifier stage.

(2) Final Amplifier Total Current Meter. Meter M-1 is in the cathode circuit of the final amplifier tubes, V-8 and V-9. This meter measures the total current flow in the final amplifier, and all of the current (both grid and plate) must flow through the meter.

(3) Bias Protection Circuit. The bias protection circuit is discussed in paragraph 61.

(4) Channel Control. The operation of the channel control circuit is described in paragraph 59.

(5) Tone Keying Control. The operation of the tone keying control circuit is discussed in paragraph 58.

b. Rectifier Power Unit Model 36D. The operation of the power distribution and relay system and the high-voltage switching unit is described in paragraph 64.

(1) AC LINE Meter. The AC LINE meter, M-1, is connected across the a-c input line by means of the LINE VOLTAGE switch, S-1. Switch S-1, a two-pole, three-position switch, is used to connect M-1 across each phase of the input line. These positions are labeled 1-2, 1-3, and 2-3. When S-1 is in position 1-2, M-1 is across phases 1 and 2; in position 1-3, M-1 is across phases 1 and 3; and in position 2-3, M-1 is across phases 2 and 3. Since there is no off position, M-1 will indicate as long as circuit breaker K-1 is closed.

(2) RF BIAS Meter. RF BIAS meter

M-2, in series with R-1, is connected across the output of the -450-volt r-f bias supply rectifier and indicates the output voltage of the rectifier.

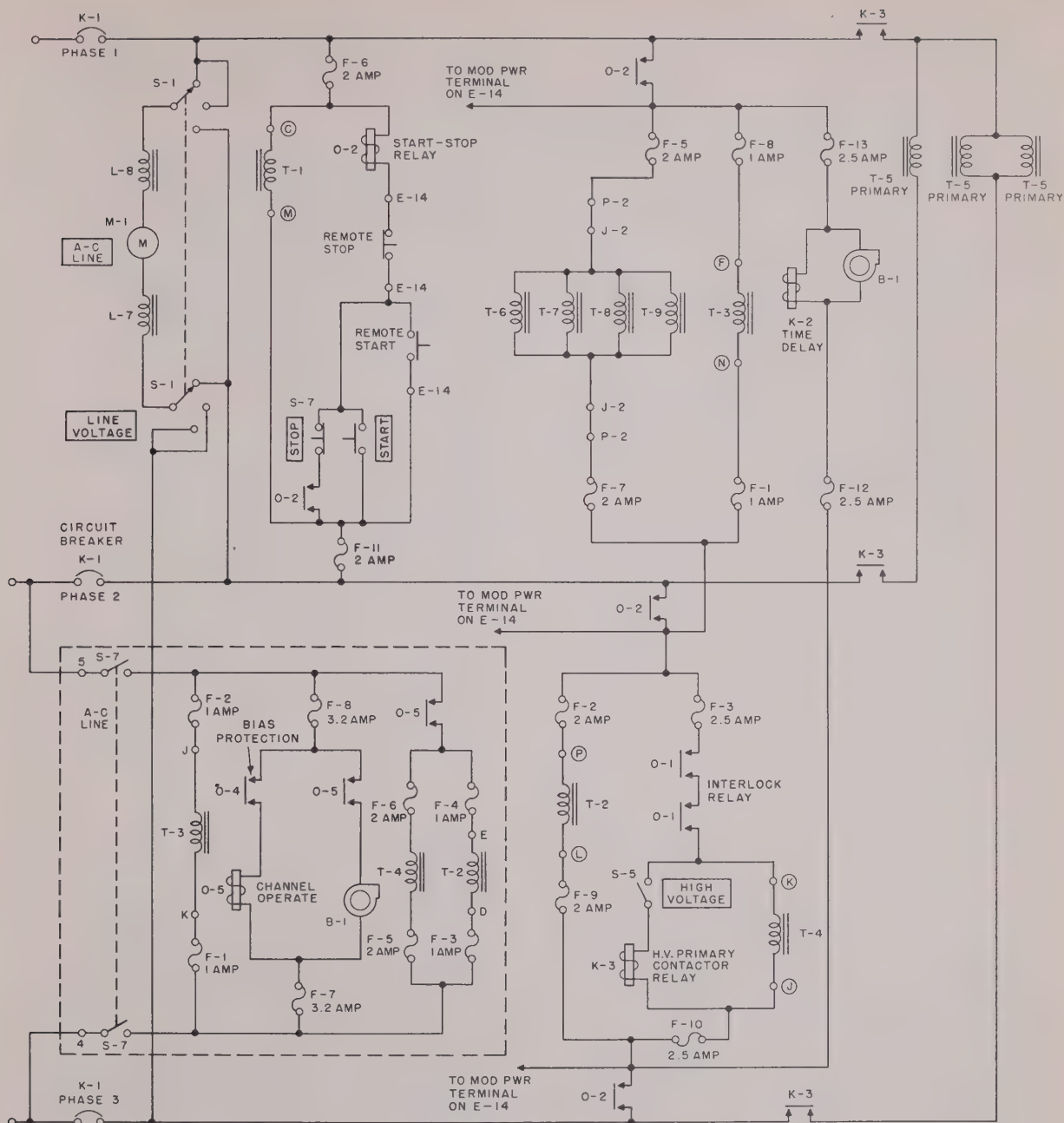
(3) LOW RF PLATE Meter. LOW RF PLATE meter M-3, in series with resistor R-2, is connected across the output of the 525-volt low-voltage plate supply rectifier and indicates the output voltage of the rectifier.

(4) FINAL PLATE Meter. FINAL PLATE meter M-4, in series with resistor R-5, is connected across the output of the 4,200-volt high-voltage rectifier and indicates the output voltage of the rectifier.

c. Control System (figs. 53 and 54). This system is designed to prevent damage to the equipment and to protect operating and maintenance personnel. All of the 220-volt, three-phase, a-c power for the rectifier, transmitter, and associated modulator is connected to terminal board E-6 of the rectifier.

(1) To start the equipment, set circuit breaker K-1 to ON and apply the 220-volt, three-phase input voltage to the rectifier unit. The AC LINE meter, M-1, is across one of the three phases and, by means of LINE VOLTAGE switch S-1, can be connected across either of the other two phases. Power is applied to transformer T-1 in the rectifier, thus causing the 12-volt d-c power supply rectifier to function and apply 12-volts dc to the d-c control circuit (fig. 54).

(2) Pushing in the START button, S-7, a normally open switch, connects 220 volts ac to the coil of the start-stop relay, 0-2. The contacts of 0-2 close and remain closed even after the START button is released. A pair of contacts on 0-2 act as holding contacts and are connected in parallel with the start switch and in series with the stop switch. The start switch is a normally open switch; the stop switch is a normally closed switch. Thus, once the coil of



NOTES:

1. (M) DENOTES TERMINALS ON P-1 AND J-1 IN RECTIFIER UNIT.
2. COMPONENTS INCLOSED BY DASHED LINES ARE IN THE TRANSMITTER UNIT.

Figure 53. A-c control circuit

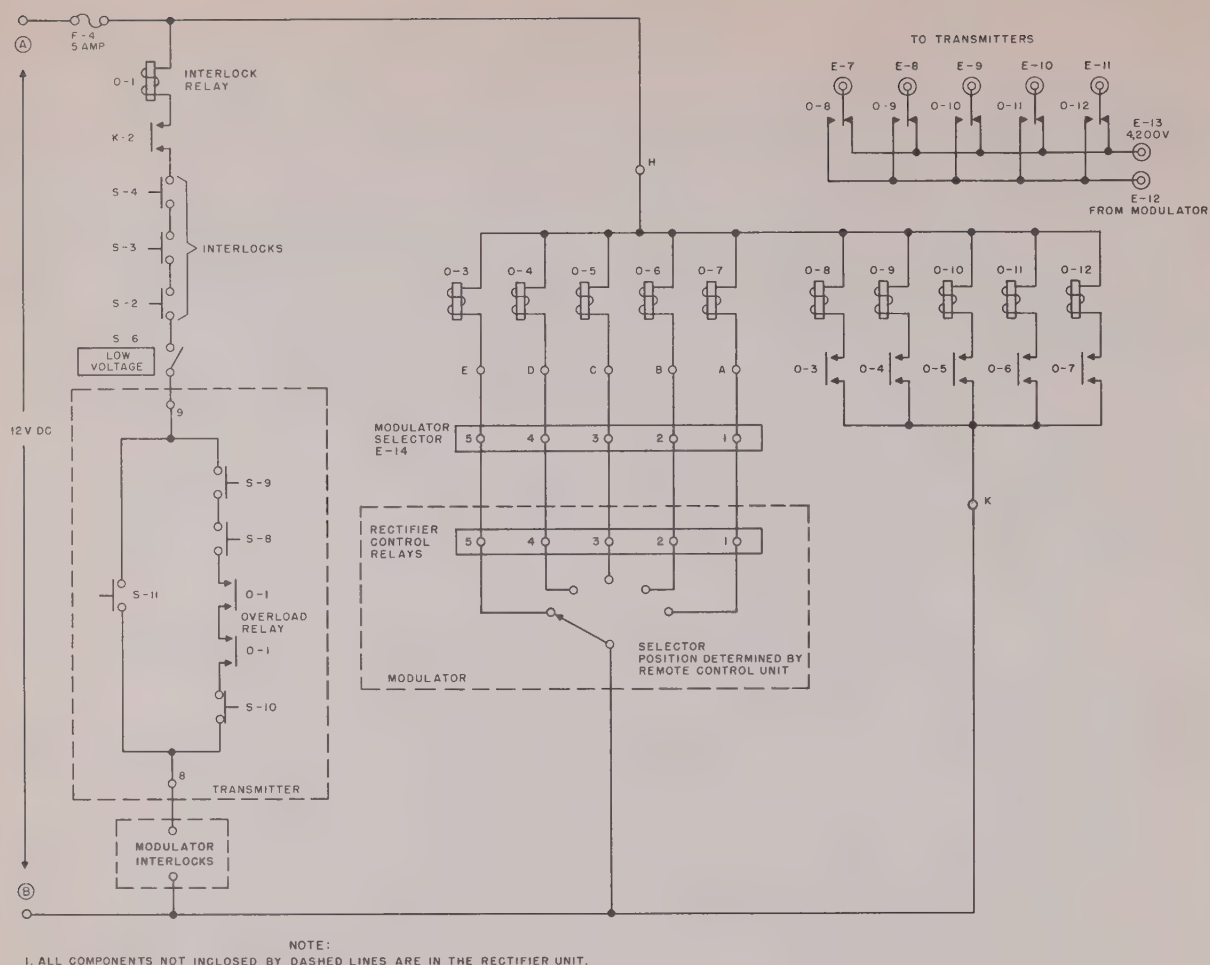


Figure 54. D-c control circuit

0-2 has been energized, it will remain so until the 220-volt circuit is opened by pushing in the STOP button. Note that the STOP terminals on main terminal board E-14 must be connected together or connected to a remote start-stop switch in order to have 0-2 operate. The remaining contacts of 0-2 connect 220 volts ac to filament transformers T-3, T-6, T-7, T-8, and T-9, power transformer T-2, blower motor B-1, the coil of time-delay relay K-2, and the associated modulator through the MOD PWR terminals on E-14. Time-delay relay K-2 closes in about 30 seconds and connects the coil of interlock relay 0-1 to the 12-volt d-c power source (fig. 54).

(3) The 12-volt d-c power is applied to the transmitter disabling and switch-

ing relays, 0-3 through 0-12, and, when all the interlock switches and LOW VOLTAGE switch S-6 are closed, to interlock relay coil 0-1. Depending upon the position of the selector in the modulator unit, the coil of one of relays 0-3 through 0-7 will be energized. The closing of the relay contacts will cause the coil of one of relays 0-8 through 0-12 to be energized. The operation of this relay will cause in one of the transmitters the application of the output of the modulator instead of the 4,200-volt output of the rectifier unit. The closing of the contacts of interlock relay 0-1 connects 22 volts ac to low-voltage plate supply rectifier power transformer T-4. The closing of the HIGH VOLTAGE switch, S-5, applies 220 volts ac to the coil of the high-voltage primary con-

tactor, K-3. The contacts of K-3, upon closing, connect the primary of the high-voltage power transformer, T-5, to the 220-volt, three-phase, a-c line.

(4) The above sequence of events makes available at the transmitter all the necessary d-c voltages needed for proper operation. The closing of the a-c line switch, S-7, on the transmitter fuse and relay panel applies 220 volts ac to filament transformer T-3 (fig. 53). The functioning of T-3 allows the operation of the channel control tube. V-6, which operates the channel control relay, 0-3 (fig. 46). The closing of the contacts of 0-3 applies sufficient voltage from the -450-volt d-c bias supply to operate the bias protection relay, 0-4 (fig. 46). The closing of the contacts of 0-4 (fig. 53) applies 220 volts ac to the channel operate relay, 0-5. One set of contacts of 0-5 when closed will apply 220 volts ac to the transmitter blower unit, B-1. The closing of another set of contacts of 0-5 applies 220 volts ac to transmitter filament transformers T-2 and T-4. The closing of the remaining contacts applies B+ to tubes V-1, V-2, V-3, and V-4.

(5) The HIGH VOLTAGE switch, S-5 (fig. 53), when opened, disconnects the h-v power transformer from the power line. This stops the h-v rectifier but does not affect the operation of the rest of the rectifier unit. If any interlock switch or LOW VOLTAGE switch S-6 is opened, or the overload relay, in the modulator or transmitter, operates, interlock relay 0-1 is de-energized and opens. This removes power from l-v rectifier power transformer T-4 and h-v rectifier power transformer T-5.

67. System Functioning

Radio Transmitter Model 96D and Rectifier Power Unit Model 36D are components of a large fixed field station that may consist of one to eight transmitters, one or two rectifiers, one to four modulators, and one to six remote control units. Figure 5 is a block diagram of a complete installation.

a. General Theory of System Operation. The operation of the equipment is controlled from a remote control unit such as Remote Control Console Wilcox Electric Type CS-212. The operator at the remote control console has the choice of any one of the transmitters in the installation that is not being used by another operator. Assuming that the equipment is in operating condition and that the transmitters are tuned to the correct frequency, the sequence of operation is as follows:

(1) From a chart, the operator selects the transmitter to be used. The chart lists the transmitters by number and the frequency at which they will transmit. Then the operator moves the TRANSMITTER SELECTOR switch to the ON position. This causes the control circuits in the transmitter to operate, connecting power to the blower and filament transformers and connecting bias and plate voltages to the tubes.

(2) The operator then turns the MODULATOR LINE switch to a modulator that is not in use. Then the operator dials the number of the transmitter which is to be used. This causes the modulator to become operative and the high-voltage switching unit in the rectifier to connect the transmitter to the modulated plate supply (par. 65f). The operator is now able to transmit.

b. Teletypewriter Operation. Radio Transmitter Model 96D can be used for carrier-shift teletypewriter operation. In order for this type of transmission to be obtained, an external source of excitation must be provided. Assuming that the transmitter is tuned up correctly, the operation is as follows:

(1) EXCITATION SWITCH S-1 on the transmitter must be in the EXTERNAL position. Also, the filtered 4,200-volt supply must be connected to the system.

(2) The operator selects the transmitter to be used and starts the teletypewriter system.

CHAPTER 5

FIELD MAINTENANCE INSTRUCTIONS

Note. This chapter contains information for field maintenance. The amount of repair that can be performed in the field is limited only by the tools and test equipment available and by the skill of the repairman.

SECTION I. PREREPAIR PROCEDURES

68. Tools, Materials, and Test Equipment

Tools, materials, and test equipment needed for performing the prerepair procedures in this section are listed below:

Tool Equipment.

Cleaning fluid: Solvent, dry-cleaning (SD); Federal spec P-S-661a.

Tube Tester.

Test Set: test meter: 0 to 1,000 volts ac, 0 to 5,000 volts dc; 0 to 10 amperes ac, 0 to 5 amperes dc; 0 to 10 megohms.

69. Stripping

a. Radio Transmitter Model 96D.

Caution: Before attempting any work on this equipment, make sure all high-voltage capacitors are discharged.

(1) Removing tubes (fig. 28). Unlock the slide by turning the slide lock handle at the center front of the unit one-

quarter turn to the left. Pull the slide forward until it is against the stops on the slides. Be sure tubes have cooled before attempting removal. Severe burns may result from hot tubes, or tubes may be damaged if handled while hot. Disconnect the plate and grid leads of V-8 and V-9 and the plate leads of V-3, V-4, and V-7. To remove the final amplifier tubes, V-8 and V-9, push down slightly and turn to the right (counterclockwise) until the tube is unlatched. Lift tube straight out of the socket. For the tubes on the exciter chassis, release tube clamps and pull tubes straight out of sockets. Do not rock or jiggle the tubes in socket if it can be extracted with a straight pull. Rock it gently if it does not release easily. Jiggling a tube in its socket during removal spreads the contacts. Label each tube as soon as it is removed so that it can be replaced later in its proper socket.

(2) Removing chokes (fig. 28). Chokes L-6, L-9, and L-12 are held in place by fuse type clips. Remove the chokes by pulling them out of their respective clips with a straight pull. Be sure to label the chokes so that they may be replaced correctly or identified when returned to stock. Handle the components carefully so that wires and insulation are not broken.

(3) Removing exciter chassis. From the inside of the slide, disconnect the two plugs P-1 and P-2. Open the door at the lower front of the slide (fig. 3) and remove the four screws that hold the exciter chassis cover to the slide. Remove the cover. Remove the eight screws that hold the exciter chassis to the slide. Remove the exciter chassis, working it out from inside the slide.

(4) Removing air filter (fig. 7). Re-

move the six screws that hold the air filter holder and air filter to the transmitter cabinet. Remove the air filter holder and take out the air filter.

(5) Removing blower assembly. Reach through the air filter opening with a screw driver and remove the four screws that hold the gasket frame and impeller housing to the back of the slide. Open the slide and disconnect the leads from the blower motor terminal block. Remove the six screws that hold the blower assembly to the bottom of the slide and remove the blower assembly.

(6) Removing fuses. Open the fuse and relay panel door. Mounted on the fuse panel are four fuses in fuse clips and eight fuses in sockets with caps with bayonet fittings. To remove the fuses in the clips, pull straight out. If a fuse puller is available, use it. To remove the fuses in the sockets, push the cap in slightly and turn counter-clockwise until free. Remove cap and pull the fuse out.

b. Rectifier Power Unit Model 36D.

Caution: Before attempting any work on this equipment, make sure all high-voltage capacitors are discharged. Before the rectifier can be stripped, it is necessary to remove the back panel. To do this, unlock the six quick-disconnect fasteners and lift the rear panel off.

(1) Removing tubes. Do not attempt to remove the tubes until they have cooled. On the 1-v rectifier chassis (fig. 12) there are only three tubes to be removed. To remove V-1, Tube JAN-5U4G, unlock the tube clamp and pull the tube straight out of the socket. Do not rock or jiggle the tube in its socket if it cannot be extracted by a direct upward pull. Rock it gently if it does not release easily. Jiggling a tube in the socket during removal spreads the contacts. To remove V-2 and V-3, Tube JAN-3B28, push the tube downward

and turn slightly until tube is free. Lift the tube out. The tubes in the h-v rectifier are removed from the front of the unit (fig. 4). Disconnect the plate cap leads. To remove the tube, push it down in the socket and turn slightly until tube is free. Remove the tube.

(2) Removing low-voltage rectifier chassis. The 1-v rectifier chassis is removed from the rear of the cabinet. Disconnect connector plug P-1 at the right rear corner of the 1-v rectifier chassis. Remove the four screws that go up through the shelf into the chassis. Pull the chassis out and off the shelf.

(3) Removing high-voltage rectifier chassis (fig. 12). Remove connector plug P-2 at the right rear corner of the chassis. Remove the four screws which hold the chassis to the shelf. Disconnect the h-v leads that come up through shelf to terminals on the chassis. Label or tag these leads. When leads are disconnected, screw the nut and washer back on the terminal. After the leads are disconnected pull them through the holes on the shelf so that they will not be damaged when the chassis is slid out. Slide the chassis out and off the shelf.

(4) Removing high-voltage switching unit. Disconnect connector plug P-3 at the upper front corner (fig. 4). Disconnect all h-v leads and label or tag them so that they may be reconnected correctly. When leads are disconnected, replace nuts and washers on the terminals so that they will not be lost. Loosen the two screws at the front of the switching unit that hold it to the cabinet side. Remove the two screws at the rear of the switching unit that hold it to the cabinet. Slide the switching unit out.

Caution: Handle the h-v switching unit carefully so as not to break the glass envelopes on the vacuum switches.

(5) Removing blower assembly. Access to the blower assembly is from

the rear of the cabinet. Disconnect the leads from the terminals on the blower motor terminal block. Remove the six screws, washers, and nuts which hold the blower assembly to the shelf. Lift off the blower assembly.

(6) Removing fuses. Thirteen fuses are mounted on the fuse panel (fig. 4). To remove the fuses, push in the caps and turn slightly counterclockwise until free. Remove the caps and pull out the fuses.

(7) Removing air filter. Follow the same procedure as outlined in paragraph 69a (4).

70. Cleaning, Inspecting, and Testing

a. Tubes. (1) Cleaning. Clean the tubes with a cloth moistened with dry cleaning solvent; if necessary, clean the grid caps, plate caps, and prongs with crocus cloth.

(2) Inspection. Inspect the tubes for cracks in glass and hose and for bent and broken prongs.

(3) Testing. Test the tubes for proper emission, leakage, and short circuits; use a tube tester or place doubtful tubes in equipment known to be operating normally.

b. Fuses. (1) Cleaning. Clean fuse ends with emery cloth and wipe with a clean cloth. If a file is used to remove deep pits, use crocus cloth to leave a smooth contact surface and then wipe with a clean cloth.

(2) Inspecting. Inspect fuse ends for evidence of burning, corrosion, and looseness.

(3) Testing. Check fuses for continuity.

c. Chokes. (1) Cleaning. Clean chokes with a cloth moistened with dry cleaning solvent; if necessary, clean the

ends of the chokes where electrical contact is made with the fuse type clips.

(2) Inspecting. Inspect the chokes for cracked insulation and for broken turns.

(3) Testing. Check the chokes for continuity.

d. Blower Assemblies. (1) Cleaning. Wipe off loose external dirt.

(2) Inspecting. Inspect the blower motor leads for breaks or fraying.

(3) Testing. Check the blower motor by applying 220 volts ac to the motor leads; check for excessive vibration.

e. Air Filters. Inspect and clean air filters as described in paragraph 41.

f. Chassis Assemblies and Cabinets. (1) Cleaning. Thorough cleaning of the chassis is necessary to insure optimum performance by preventing corrosion, rust, and dust from damaging parts or causing arc-overs or low-resistance leakage between h-f points and ground. With a brush or blower remove loose dust and dirt. With a brush or cloth and solvent (SD) remove dirt and grease which adheres to the chassis and parts.

(2) Inspection. After the chassis has been thoroughly and carefully cleaned, make a visual inspection as follows:

(a) Examine for burned insulation and resistors. Examine for wax leakage and any discoloration of apparatus and wire.

(b) Inspect for broken connections to tube sockets, plugs, and other apparatus as well as for defective soldered connections. Examine for bare wires touching the chassis or cabinet or other wires.

(c) Test the operation of all switches. They should not bind and make poor electrical contact.

(d) Examine the operation of variable resistors and the shafts of other controls. They should move freely and smoothly, without binding.

(e) Inspect the tuning controls, gear drives, and counters for loose, bent, or otherwise damaged parts. Be sure that the controls, counters, and other components of the tuning mechanisms operate smoothly.

(f) Examine coils and capacitors for signs of overheating, burned insulation, loose connections, and cracked envelopes.

(g) Inspect connectors for loose or bent prongs. Repair or replace connectors as required. Inspect h-v switchbox for burned contacts, broken insulators, warped or burned contact fingers.

(h) Inspect relays for loose, burned, or broken contacts. Look for indications of overheating.

(i) Inspect for loose or missing screws, especially those which fasten the tube sockets and interlock switches in place.

71. Reassembling Stripped Components

a. Exciter Chassis. Following the reverse procedure of paragraph 69a (3), replace the exciter chassis.

b. Transmitter Blower Assembly. Following the reverse procedure of paragraph 69a (5), replace the blower assembly.

c. Rectifier Blower Assembly. The blower assembly is mounted on the third shelf from the top of the cabinet (fig. 12). Install the blower assembly as follows:

(1) From the rear of the cabinet, slide the blower assembly into position so that the impeller housing faces the

rear of the cabinet.

(2) Insert six screws with washers through the slots in the base and into the holes in the shelf. Attach four stop-nuts and washers to the screws and tighten finger tight.

(3) Move the blower assembly until the outer edge of the gasket material is approximately 1/16 inch inside the outside edge of the cabinet. Tighten the screws securely to hold the blower assembly in this position.

(4) Connect the two wires to the terminals on the side of the motor terminal box. Tighten the connecting screws securely.

d. H-V Switching Unit. To reinstall the h-v switching unit, proceed as follows:

(1) Insert two screws into the holes at the front edge of the cabinet. Do not take the screws down tight, but enough to hold them in place.

(2) From the rear of the cabinet slide the h-v switching unit into the cabinet until the slots at the front edge of the chassis engage the screws previously installed. Be sure that the jack (J-3) is at the top toward the front of the cabinet.

Caution: Use care in handling the unit to prevent damaging it.

(3) Line up the slots at the rear edge of the h-v switching unit chassis with the holes in the cabinet. Install the two screws required. Fasten the unit securely to the cabinet by screwing down the four screws tightly.

(4) Replace the h-v connections.

(5) Insert plug (P-3) into the jack (J-3) so that the key and the keyway line up. Screw the rotating collar on the plug onto the jack and tighten securely.

e. H-V Chassis. Follow the same procedure as outlined in paragraph 16c.

f. L-V Chassis. Follow the same procedure as outlined in paragraph 16d.

g. Tubes. Follow the same procedure as outlined in paragraphs 15b and 16e.

h. Chokes And Fuses. Replace the chokes and fuses in their respective clips.

SECTION II. TROUBLE SHOOTING AT LABORATORY LEVEL

Warning: When servicing Radio Transmitter Model 96D and Rectifier Power Unit Model 36D be extremely careful because of the high voltages that may still be present in the circuit even after the equipment is shut down. Always pull out the h-v switch, S-12, on the transmitter. Ground out capacitors C-25, C-26, C-27, C-29, C-30, and C-35 in the transmitter. In the rectifier, ground out capacitors C-7 and C-8. Keep one hand in the pocket when measuring voltages with the probe. Before touching any part after the power is shut off, short the part to the ground.

72. Trouble-Shooting Procedures

The first step in servicing a defective transmitter or rectifier is to sectionalize the fault. Sectionalization means tracing the fault to the major component or circuit responsible for the abnormal operation of the set. The second step is to localize the fault. Localization means tracing the fault to the defective part responsible for the abnormal operation. Some faults such as burned-out resistors, r-f arcing, and shorted transformers or capacitors can often be located by sight, smell, and hearing.

The majority of faults, however, must be localized by checking voltage and resistance.

a. System Sectionalization. System sectionalization is discussed in paragraphs 48, 49, and 50.

b. Component Sectionalization and Localization. The tests in this section aid in isolating the source of trouble. To be effective, the procedure should be followed in the order given. Remember that servicing procedure should cause no further damage to the equipment. First, trouble should be localized to a single stage or circuit. Then the trouble may be isolated within that stage or circuit by appropriate voltage, resistance, and continuity measurements. The service procedure is summarized as follows:

(1) Visual inspection. Through this inspection alone (par. 70), the repairman may frequently discover the trouble or determine the stage in which the trouble exists. This inspection is valuable in avoiding additional damage to the equipment which might occur through improper servicing methods and in forestalling future failures.

(2) Power supply test. The power supply test (par. 75) prevents further damage to the transmitter or rectifier from certain possible short circuits. Since this gives an indication of the operation of the rectifier and its filter circuits, its function is more often preventive.

(3) Operational test. The operational test (par. 76) is important because it frequently indicates the general location of the trouble. In many instances, the information gained will determine the exact value of the fault. In order to utilize this information fully, all results must be interpreted in relation to each other.

(4) Trouble-shooting chart. The trouble symptoms listed in this chart

(pars. 77 and 78) will aid greatly in localizing trouble.

(5) Intermittents. In all these tests the possibility of intermittents should not be overlooked. If present, this type of trouble often may be made to appear by tapping or jarring the parts. It is possible that the trouble is not in the transmitter itself but in the installation

(keying lines, remote control unit, or modulator). In this event, test the installation, if possible.

73. Trouble-Shooting Data

Take advantage of the material supplied in this manual. It will help in the rapid location of faults. Consult the following trouble-shooting data:

a. Radio Transmitter Model 96D.

Fig. No.	Description
91	Radio Transmitter Model 96D, schematic diagram.
28	Radio Transmitter Model 96D, view of slide interior.
21	Radio Transmitter Model 96D, view of fuse and relay panel.
56	Radio Transmitter Model 96D, top view of exciter chassis.
57	Radio Transmitter Model 96D, interior view of exciter chassis.
55	Radio Transmitter Model 96D, view of high-voltage switch box.
58	Radio Transmitter Model 96D, exciter chassis, tube socket voltage and resistance chart.

b. Rectifier Power Unit Model 36D.

Fig. No.	Description
92	Rectifier Power Unit Model 36D, schematic diagram.
24	Rectifier Power Unit Model 36D, view of fuse and relay panels.
62	Rectifier Power Unit Model 36D, top view of low-voltage rectifier.
63	Rectifier Power Unit Model 36D, interior view of low-voltage rectifier.
65	Rectifier Power Unit Model 36D, top view of high-voltage switch unit.
66	Rectifier Power Unit Model 36D, interior view of high-voltage switch unit.
60	Rectifier Power Unit Model 36D, top view of high-voltage rectifier.
61	Rectifier Power Unit Model 36D, interior view of high-voltage rectifier.
64	Rectifier Power Unit Model 36D, tube socket resistance chart.

74. General Precautions

Whenever a transmitter or rectifier is to be serviced, observe the following precautions very carefully:

a. High Voltages. Be careful when any panels are removed; dangerous voltages are exposed.

b. Replacing Parts. Careless replacement of parts often makes new faults inevitable. Note the following points:

(1) Before a part is unsoldered or disconnected, note the position of the leads. If the part, such as a transformer, has a number of connections, tag each of the leads to it.

(2) Be careful not to damage other leads by pulling or pushing them out of the way.

(3) Do not allow drops of solder to fall into the set; they may cause a short circuit.

(4) A carelessly soldered connection may create a new fault. It is very important to make well-soldered joints, since a poorly soldered joint is one of the most difficult faults to find.

(5) When a part is replaced in r-f circuits, it must be replaced exactly as the original one. A part which has the same electrical value, but different physical size, may cause trouble when operating at high frequencies. Give particular attention to proper grounding when replacing a part. Use the same ground point as in the original wiring. Failure to observe these precautions may result in a decreased gain or possibly in oscillation of the circuit.

c. Voltage Measurements. Voltage measurements are almost an indispensable aid to the repairman, because most troubles result from abnormal voltages or produce abnormal voltages. Voltage measurements are taken easily

because they are always made between two points in a circuit and the circuit need not be interrupted.

(1) Unless otherwise specified, the voltages tested on the voltage charts are measured between the indicated points and ground (chassis).

(2) Always begin by setting the voltmeter on the highest range, so that the voltmeter will not be overloaded. Then, if it is necessary to obtain increased accuracy, set the voltmeter to a lower range.

(3) In checking cathode voltages, remember that a reading can be obtained when the cathode resistor is actually open. The resistance of the meter may act as a cathode resistor. Thus the cathode voltage may appear to be approximately normal only as long as the voltmeter is connected between cathode and ground. Before the cathode voltage is measured, make a resistance check with a cold circuit to determine the value of the cathode resistor.

(4) Certain precautions must be followed when measuring voltage above a few hundred volts. High voltages are dangerous and can be fatal. When it is necessary to measure high voltages, observe the following rules:

(a) Connect the ground lead to the voltmeter.

(b) Place one hand in your pocket. This will eliminate the possibility of making accidental contact with either ground or another part of the circuit, causing electricity to travel from one hand to the other.

(c) If the voltage is less than 300 volts, connect the test lead to the hot terminal (which may be either positive or negative with respect to ground).

(d) If the voltage is greater than 300 volts, shut off the power, connect the hot lead, step away from the voltmeter,

turn on the power, and note the reading of the voltmeter. Do not touch any part of the voltmeter, particularly when it is necessary to measure the voltage between two points which are above ground potential.

(5) It is essential that the resistance of the voltmeter be at least 10 times as large as the resistance of the circuit across which the voltage is measured. If the voltmeter resistance is comparable to the circuit resistance, the voltmeter will indicate a voltage lower than the actual voltage which is present when the voltmeter is removed from the circuit.

(6) The resistance of the voltmeter on any range can always be calculated by the following simple rule: Resistance of the voltmeter equals the ohms per volt multiplied by the full-scale range in volts. For example: The resistance of a 1,000-ohms-per-volt meter on the 300-volt range is 300,000 ohms. ($R = 1,000 \text{ ohms per volt} \times 300 \text{ volts} = 300,000 \text{ ohms}$).

(7) To minimize the voltmeter loading in high-resistance circuits, use the highest voltmeter range. Although only a small deflection will be obtained (possibly only 5 divisions on a 100-division scale) the accuracy of the voltage measurement will be increased. The decreased loading on the voltmeter will more than compensate for inaccuracy which results from reading only a small deflection on the scale of the voltmeter.

d. Resistance Measurements. An ohmmeter is used for resistance measurements in servicing defective equipment. Before making any resistance measurements, shut down the equipment. Before making a resistance measurement, short-circuit the meter probe and make the zero adjustment. This adjustment consists merely of turning the zero-adjustment knob or screw so that the meter reads zero ohms when the probes are short circuited. This

adjustment must be made everytime the ohmmeter scale is changed. The zero adjustment of resistance measurements is not to be confused with the adjustment on the lower center of the meter face.

75. Power Supply Test

Trouble within the rectifier unit may often be detected by checking circuit resistance measurements. In addition, resistance checks of the h-v circuits must be made before applying power, to prevent damage to the power supplies. Make the following resistance checks before attempting to put the equipment in operation, and correct all abnormal conditions before applying power.

a. Rectifier Unit.

Terminals E-1 and E-2 to ground should each be 33,500 ohms.

Terminals E-3 and E-4 to ground should each be 160,000 ohms.

Terminal E-5 to ground should be 80,000 ohms.

b. Transmitter Unit.

Terminals E-5 and E-6 to ground should measure infinite resistance.

Pin 10 on terminal board E-7 to ground should measure infinite resistance.

Pin 7 on terminal board E-7 to ground should measure 437,000 ohms.

76. Operational Test of Transmitter

Operate the equipment as described in paragraph 50, the equipment performance checklist for the transmitter. The equipment performance test is important because it frequently indicates the general location of the trouble:

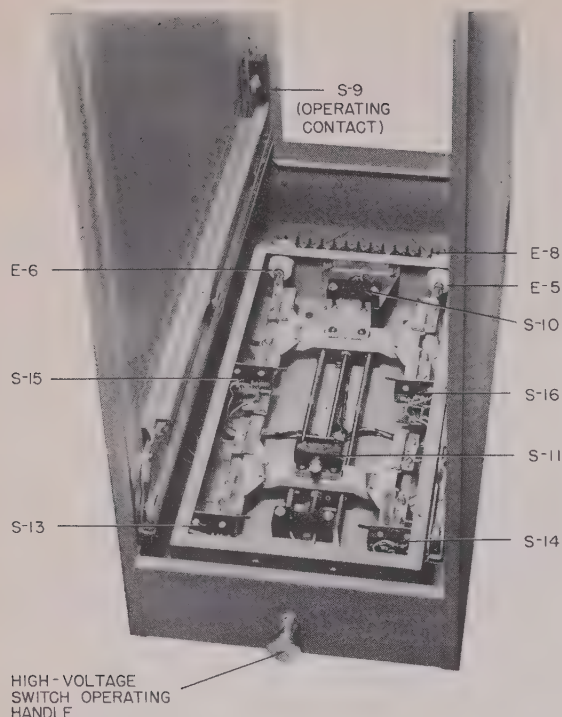


Figure 55. Radio Transmitter Model 96D, interior view of high-voltage switch box

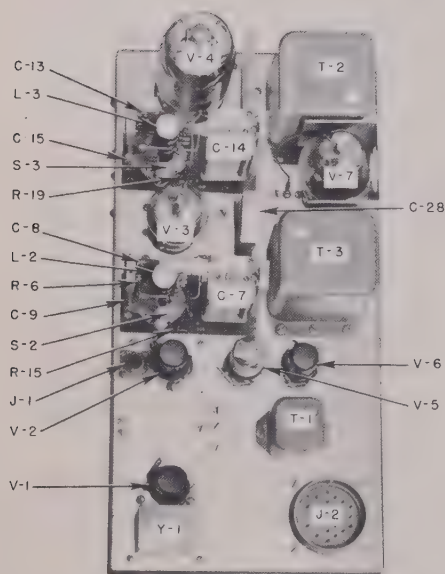


Figure 56. Radio Transmitter Model 96D, top view of exciter chassis

77. Trouble-Shooting Chart for Radio Transmitter Model 96D.

The following chart is supplied as an aid in locating trouble in the transmitter. The chart is broken down into four major groups. This chart lists the symptoms which the operator may observe when taking voltage measurements. The chart also indicates how to localize trouble quickly to the channel control, keying circuit, exciter, or the final amplifier stages of the transmitter. A tube check and resistance measurements of the faulty stage should ordinarily be sufficient to isolate the defective part.

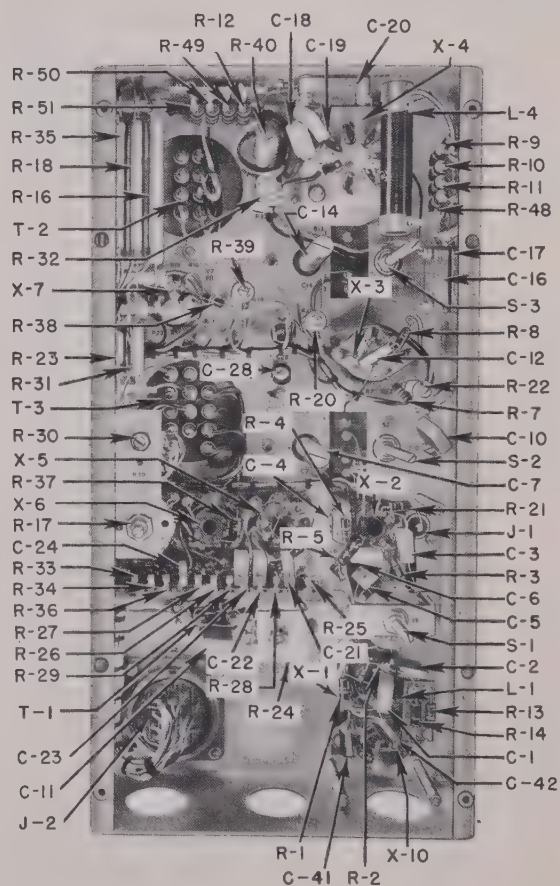


Figure 57. Radio Transmitter Model 96D, interior view of exciter chassis

a. Localizing Trouble in Exciter (figs. 56 and 57).

Symptom	Probable trouble	Correction
1. Voltages at all pins of V-1 normal except: a. No voltage between pins 2 and 7. b. No voltage at pin 3. c. No voltage at pin 6. d. No voltage at pin 8. e. No voltage at pins 6 and 8. f. No carrier signal.	a. Either fuse F-1 or F-2 burned out. Winding on transformer T-3 burned out. Broken filament lead. b. Shorted capacitor C-3. Defective keying control circuit. c. Open resistor R-2. d. Open resistor R-13. Open choke L-1. e. Open resistor R-14. Shorted capacitor C-2. Defective switch S-1. f. Defective crystal Y-1. Defective tube V-1.	a. Replace F-1 or F-2. Replace T-3. Repair lead. b. Replace C-3. Refer to paragraph 58. c. Replace R-2. d. Replace R-13. Replace L-1. e. Replace R-14. Replace C-2. Repair or replace S-1. f. Replace Y-1. Replace V-1.
2. Voltages at all pins of V-2 normal except: a. No voltage between pins 2 and 7. b. No voltage at pin 3. c. Positive voltage at pin 4. d. No voltage at pin 4 e. No voltage at pin 5. f. - No voltage at pin 6. g. No voltage at pin 8. h. No voltage at pins 6 and 8.	a. See item 1a above. b. Defective switch S-1. c. Shorted capacitor C-5. d. Open resistor R-3. e. Shorted capacitor C-4. f. Open resistor R-5. Shorted capacitor C-6. Open potentiometer R-17. g. Open resistor R-15. Shorted capacitor C-9. h. Open resistor R-18.	a. See item 1a above. b. Repair or replace S-1. c. Replace C-5. d. Replace R-3. e. Replace C-4. f. Replace R-5. Replace C-6. Replace R-17. g. Replace R-15. Replace C-9. h. Replace R-18.
3. Voltage at all pins of V-3 normal except: a. No voltage between pins 1 and 5. b. No voltage at pin 2.	a. See item 1a above. b. Open resistor R-8. Shorted capacitor C-12.	a. See item 1a above. b. Replace R-8. Replace C-12.

a. Localizing Trouble in Exciter (figs. 56 and 57) (contd).

Symptom	Probable trouble	Correction
c. No voltage at pin 3.	c. Open resistor R-7 or R-22. Shorted capacitor C-10.	c. Replace R-7 or R-22. Replace C-10.
d. Positive voltage at pin 3.	d. Shorted capacitor C-8.	d. Replace C-8.
e. No voltage on cap of V-3.	e. Open coil L-3. Defective switch S-3. Open resistor R-19 or R-20. Shorted capacitor C-15.	e. Repair or replace L-3. Repair or replace S-3. Replace R-19 or R-20. Replace C-15.
4. All voltages at pins of V-4 normal except:		
a. No voltage between pins 1 and 7.	a. Fuse F-3 or F-4 burned out. Transformer T-2 burned out. Relay 0-5 defective.	a. Replace F-3 or F-4. Replace T-2. Check and repair relay.
b. No voltage at pin 3.	b. Open resistor R-12, R-49, R-50, or R-51. Shorted capacitor C-20.	b. Replace resistor. Replace C-20.
c. No voltage at pin 4.	c. Open choke L-4. Open resistor R-9, R-10, R-11, R-48, or R-32. Shorted capacitor C-16 or C-17.	c. Replace or repair L-4. Replace resistor. Replace C-16 or C-17.
d. Positive voltage at pin 4.	d. Shorted capacitor C-13.	d. Replace C-13.
e. No voltage on cap of V-4.	e. Open choke L-5 or L-6. Shorted capacitor C-29. Fuse F-11 burned out.	e. Repair or replace L-5 or L-6. Replace C-29. Replace F-11.
5. No plate or screen grid voltage on V-1, V-2, V-3 and screen grid of V-4.	5. Blown fuse F-10. Relay 0-5 not operating correctly.	5. Replace F-10. Replace or repair 0-5.
6. No filament voltage on V-1, V-2, V-3, and V-4.	6. A-c line switch S-7 defective or open.	6. Repair or replace S-7.

b. Localizing Trouble in Final Amplifier (fig. 28).

Symptom	Probable trouble	Correction
1. No indication on meter M-1.	1. Capacitor C-26 detuned. Capacitor C-25 open.	1. Retune C-26. Replace C-25.
2. Meter M-1 reading too low.	2. Final amplifier not loaded correctly. Capacitor C-30 shorted. Capacitor C-35 shorted. +4,200-volt supply low. Defective tube V-7, V-8, or V-9. Fuse F-12 burned out.	2. Refer to paragraph 30. Replace C-35. Refer to paragraph 69a. Replace V-7, V-8, or V-9. Replace F-12.

b. Localizing Trouble in Final Amplifier (fig. 28) (contd).

Symptom	Probable trouble	Correction
3. Overload relay 0-1 operates at too low a current.	3. OVERLOAD ADJUST control out of adjustment. Potentiometer R-42 open. Relay 0-1 defective.	3. Refer to paragraph 33. Replace R-42. Replace 0-1.
4. Underload relay 0-2 operates at too low a current.	4. UNDERLOAD ADJUST control out of adjustment. Potentiometer R-43 open. Relay 0-2 defective.	4. Refer to paragraph 33. Replace R-43. Replace 0-2.
5. Positive voltage on grid caps of V-8 and V-9.	5. Capacitor C-25 shorted.	5. Replace C-25.
6. Voltages at pins of bias isolator tube V-7 normal except:		
a. No d-c voltage at pins 1 and 4.	a. Shorted capacitor C-28 or C-40.	a. Replace C-28 or C-40.
b. No a-c voltage between 1 and 4.	b. Defective transformer T-3. Fuse F-1 or F-2 burned out.	b. Replace T-3. Replace F-1 or F-2.
c. No voltage at pin 1, 3, or 4.	c. Defective bias circuit. Fuse F-9 burned out.	c. Refer to paragraph 77. Replace F-9.

c. Localizing Trouble in Channel Control and Keying Circuits (figs. 56 and 57)

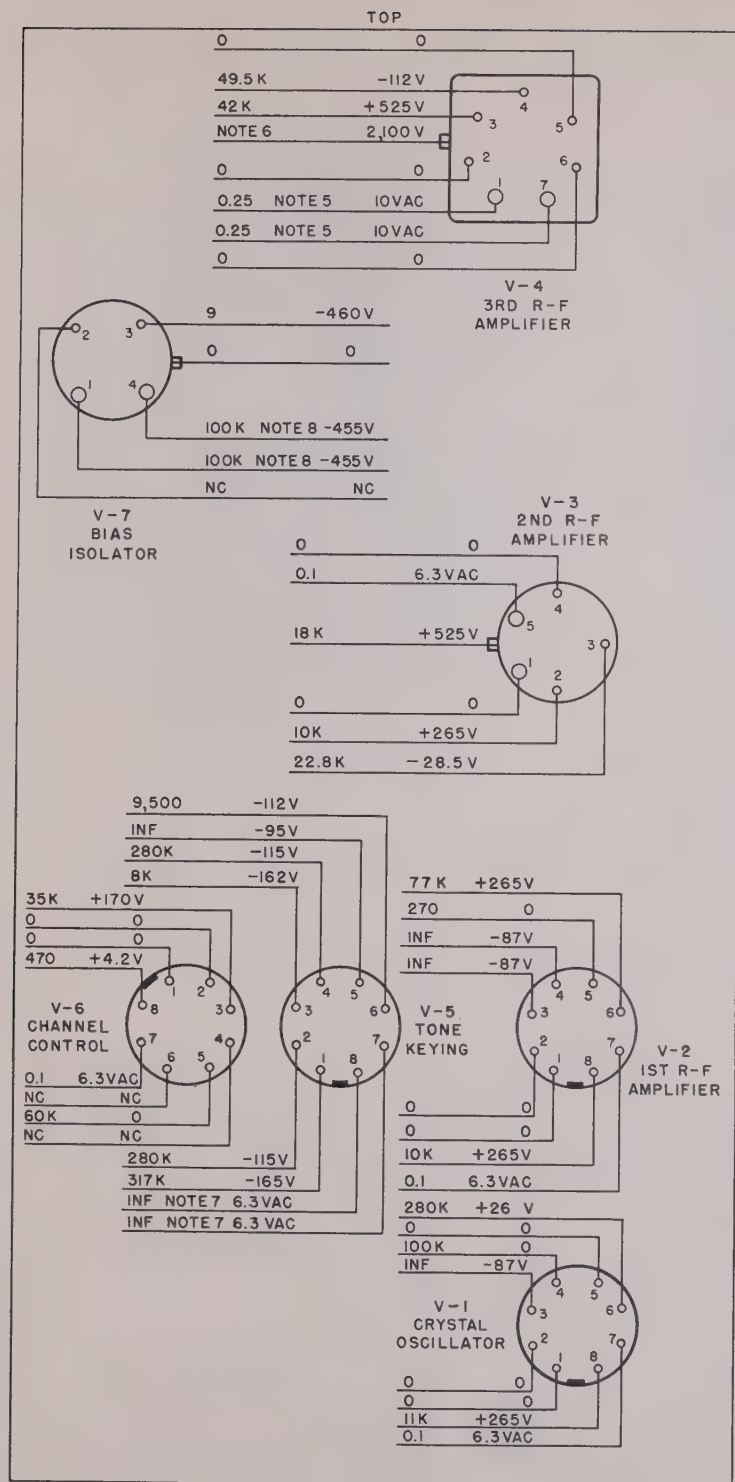
Symptom	Probable trouble	Correction
1. When CHANNEL CONTROL switch S-6 is closed:		
a. Relay 0-3 fails to close.	a. Relay 0-3 defective. Open resistor R-44, R-45, or R-46. Defective tube V-6. Open resistor R-37. Defective switch S-6	a. Repair or replace 0-3. Replace R-44, R-45, or R-46. Replace V-6. Replace R-37. Replace S-6.
b. Relay 0-3 operates, relay 0-4 fails to operate.	b. Defective contacts on relay 0-3. Open resistor R-23, R-30, R-31, or R-35. Relay 0-4 defective.	b. Repair or replace 0-3. Replace R-23, R-30, R-31, or R-35. Repair or replace 0-4.
c. Relays 0-3 and 0-4 operate. Relay 0-5 fails to operate.	c. Defective contacts on relay 0-4. Fuse F-7 or F-8 blown out. Defective relay 0-5.	c. Replace or repair 0-4. Replace F-7 or F-8. Repair or replace 0-5.
2. When selected for use by remote control unit:		

c. Localizing Trouble in Channel Control and Keying Circuits (figs. 56 and 57) (contd).

Symptom	Probable trouble	Correction
a. Relay 0-3 fails to close.	a. Keying lines from remote control unit defective. Open transformer T-1. Refer to item 1a above.	a. Repair keying lines. Replace T-1. Refer to item 1a above.
3. Relay 0-3 remains closed even when CHANNEL CONTROL test key and simplex circuit are opened.	3. Capacitor C-24 shorted. Resistor R-36 open. Defective relay 0-3.	3. Replace C-24. Replace R-36. Repair or replace 0-3.
4. Relay 0-4 remains closed when relay 0-3 opens.	4. Contacts of relay 0-3 stuck. Defective relay 0-4.	4. Repair or replace 0-3. Repair or replace 0-4.
5. Relay 0-4 opens, relay 0-5 remains closed.	5. Contacts of relay 0-4 stuck. Defective relay 0-5.	5. Repair or replace 0-4. Repair or replace 0-5.
6. When TEST KEY is closed, keying control circuit fails to operate.	6. Switch S-1 defective.	6. Repair or replace S-1.
7. Transmitter is constantly keyed.	7. Capacitor C-3 shorted. KEYING BIAS ADJUST control (R-30) out of adjustment. Resistor R-26 open. Tube V-5 defective. Capacitor C-22, C-23 shorted.	7. Replace C-3. Readjust R-30, paragraph 33. Replace R-26. Replace V-5. Replace C-22 and C-23.
8. Keying circuit fails to operate on keying signal from control console.	8. Transformer T-1 defective. Resistor R-24 out of adjustment. Resistor R-25, R-26, R-27, or R-29 open. Tube V-5 defective. Capacitor C-21, or C-11 shorted. Potentiometer R-30 out of adjustment.	8. Replace T-1. Adjust R-24 (par. 33). Replace R-25, R-26, R-27, or R-29. Replace V-5. Replace C-11, C-21, or adjust R-30 (par. 33).

d. Localizing Trouble in Bias Supply and Control Circuit (figs. 56 and 57).

Symptom	Probable trouble	Correction
1. No plate or screen voltage to exciter stage tubes.	1. Fuse F-10 blown. Relay 0-5 defective. Resistor R-23, R-30, R-31, R-32, or R-35 open. Resistor R-18 open. -450-volt supply defective.	1. Replace F-10. Repair or replace 0-5. Replace R-23, R-30, R-31, R-32, or R-35. Replace R-18. Refer to paragraph 78d.
2. No bias voltage at V-4.	2. Resistor R-35 or R-38 open. Refer to item 1 above.	2. Replace R-35 or R-38. Refer to item 1 above.
3. No bias voltage at V-8 and V-9.	3. Resistor R-38 or R-41 open. Choke L-9 or L-12 open.	3. Replace R-38 or R-41. Replace L-9 or L-12.



NOTES

1. ALL VOLTAGE AND RESISTANCE MEASUREMENTS ARE BETWEEN POINT INDICATED AND GROUND UNLESS OTHERWISE INDICATED
2. USE A VACUUM-TUBE VOLTMETER OR OTHER VOLTMETER WITH NEGLIGIBLE POWER CONSUMPTION
3. CONDITIONS FOR RESISTANCE MEASUREMENTS
 - A. ALL TUBES IN SOCKETS, CRYSTAL REMOVED
 - B. S-12, HIGH-VOLTAGE SWITCH, PULLED OUT
 - C. S-1, EXCITATION SWITCH, INTERNAL POSITION
 - D. S-5, TEST KEY, OFF
 - E. S-6, CHANNEL CONTROL, OFF
 - F. S-7, AC LINE, OFF
 - G. R-17, EXCITATION ADJUST, MAX CLOCKWISE
 - H. R-30, KEYING BIAS ADJUST, NORMAL POSITION OR APPROX MIDWAY BETWEEN EXTREMES
 - J. EXCITER UNIT IN PLACE AND CONNECTED
4. CONDITIONS FOR VOLTAGE MEASUREMENTS
 - A. ALL TUBES IN SOCKETS, CRYSTAL REMOVED
 - B. S-12, HIGH-VOLTAGE SWITCH, IN
 - C. S-1, EXCITATION SWITCH, INTERNAL POSITION
 - D. S-5, TEST KEY, OFF
 - E. S-6, CHANNEL CONTROL, ON
 - F. S-7, AC LINE, ON
 - G. R-17, EXCITATION ADJUST, MAX CLOCKWISE
 - H. R-30, KEYING BIAS ADJUST, NORMAL POSITION OR APPROX MIDWAY BETWEEN EXTREMES
 - J. EXCITER UNIT IN PLACE AND CONNECTED
 - K. RECTIFIER UNIT, PP-219A/FRT, ON AND FURNISHING NORMAL VOLTAGES TO TRANSMITTER
5. MEASURED BETWEEN PINS 1 AND 7
6. 1.8 OHMS WITH 2-6.5 MC PLATE CHOKE IN CIRCUIT
8.8 OHMS WITH 6.5-18 MC PLATE CHOKE IN CIRCUIT
7. MEASURED BETWEEN PINS 7 AND 8
8. 6.3 VAC BETWEEN PINS 1 AND 4

Figure 58. Radio Transmitter Model 96D, Tube socket voltage and resistance diagram

78. Trouble-Shooting Chart for Rectifier Power Unit Model 36D.

The following chart is supplied as an aid in locating trouble in the rectifier. This chart lists the symptoms which the operator may observe when taking voltage measurements. The chart is divided into six major groups so that trouble can be localized quickly to one of the components of a major unit such as the h-v rectifier assembly or the l-v rectifier assembly. A tube check and resistance measurements of the defective stage should ordinarily be sufficient to isolate the defective part.

- NOTICE -

The illustration at the right (fig. 59) shows the high-voltage power transformer used with the Rectifier system detailed in schematic diagram, figure 94. The Rectifier system shown in schematic diagram (fig. 92) incorporates a different type transformer; ie, terminals are located on the front and access to same is through front door E, shown in figure 10.

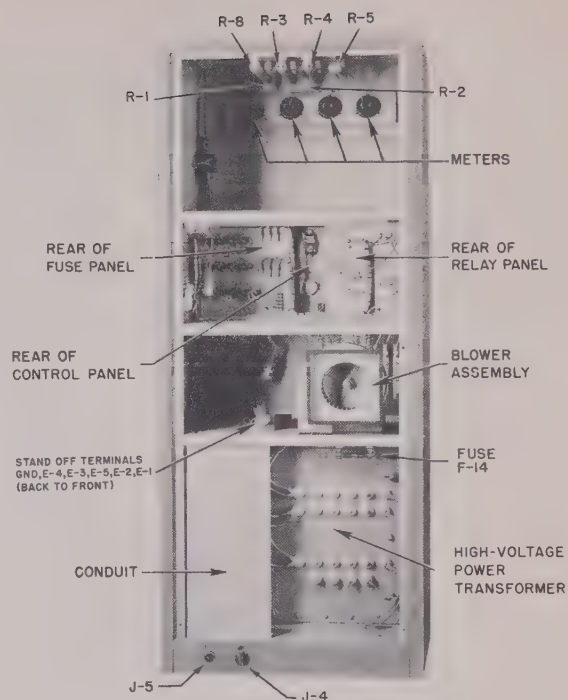


Figure 59. Rectifier Power Unit Model 36D rear view, components removed. (Jacks J-4 and J-5 are optional items)

a. Localizing Trouble in +4,200-Volt Supply (fig. 59).

Symptom	Probable trouble	Corrections
1. No reading on FINAL PLATE meter M-1.	1. Resistor R-5 open. Capacitor C-7 shorted. Fuse F-14 blown. Control circuit faulty.	1. Replace R-5. Replace C-7. Replace F-14. Check continuity.
2. Low reading on FINAL PLATE meter M-1.	2. Defective tube V-4, V-5, V-6, V-7, V-8, or V-9. Incorrect connections to primary taps on T-5.	2. Replace defective tube. Connect to proper taps.
3. High reading on FINAL PLATE meter M-1.	3. Filter choke L-5 shorted. Resistor R-3 or R-4 open.	3. Replace L-5. Replace R-3 or R-4.
4. No or low voltage on terminal E-3. +4,200 volts.	4. Filter choke L-5 shorted to ground.	4. Replace L-5.
5. Excess hum on teletype-writer operation.	5. Defective choke L-5. Open capacitor C-7.	5. Replace L-5. Replace C-7.

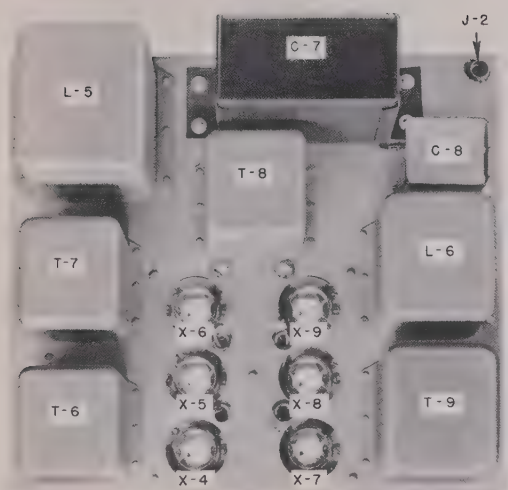


Figure 60. Rectifier Power Unit Model 36D, top view high-voltage rectifier chassis

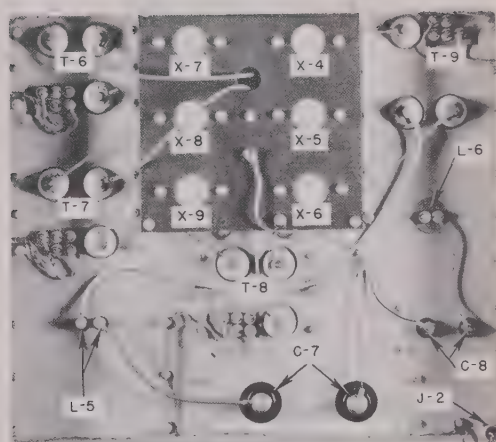


Figure 61. Rectifier Power Unit Model 36D, interior view high-voltage rectifier chassis

b. Localizing Trouble in +2,100-Volt Supply (figs. 60 and 61).

Symptom	Probable trouble	Correction
1. No +2,100-volt output.	1. Fuse F-5 or F-7 blown. Filter choke L-6 open. Capacitor C-8 shorted. Control and interlock circuits faulty.	1. Replace Fuse F-5 or F-7. Replace L-6. Replace C-8. Check continuity.
2. Low voltage on +2,100-volt terminal.	2. Defective capacitor C-8.	2. Replace C-8.
3. Too high voltage on +2,100-volt terminal.	3. Filter choke L-6 shorted. Resistor R-8 open.	3. Replace L-6. Replace R-8.
4. Excess hum on phone operation.	4. Shorted choke L-6. Open capacitor C-8.	4. Replace L-6. Replace C-8.



Figure 62. Rectifier Power Unit Model 36D, top view low-voltage rectifier chassis

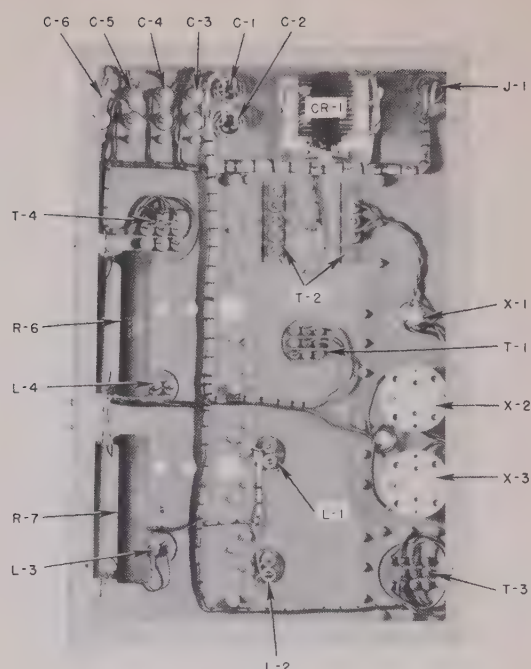


Figure 63. Rectifier Power Unit Model 36D, interior view low-voltage rectifier chassis

c. Localizing Trouble in +525-Volt Supply (figs. 62 and 63).

Symptom	Probable trouble	Correction
1. No reading on LOW RF PLATE meter M-3.	1. Resistor R-2 open. Fuse F-1, F-8, F-3, or F-10 blown. Choke L-3 or L-4 opened. Capacitor C-5 or C-6 shorted. Transformers T-3 or T-4 defective. Tubes V-2 or V-3 defective.	1. Replace R-2. Replace F-1, F-8, F-3, or F-10. Replace L-3 or L-4. Replace C-5 or C-6. Replace T-3 or T-4. Replace V-2 or V-3.
2. Low reading on LOW RF PLATE meter M-3.	2. Tubes V-2 or V-3 defective.	2. Replace V-2 or V-3.
3. High reading on LOW RF PLATE meter M-3.	3. Choke L-3 or L-4 shorted. Resistor R-7 open.	3. Replace L-3 or L-4. Replace R-7.
4. Excess ripple as indicated on received signal from transmitter.	4. Capacitor C-5 or C-6 open. Chokes L-3 or L-4 shorted.	4. Replace C-5 or C-6. Replace L-3 or L-4.

d. Localizing Trouble In -450-Volt Supply (figs. 62 and 63).

Symptom	Probable trouble	Correction
1. No reading on RF BIAS meter M-2.	1. Resistor R-1 open. Capacitor C-3 or C-4 shorted. F-2 or F-9 blown. Defective transformer T-2 or T-3. Defective tube V-1. Filter choke L-1 or L-2 open.	1. Replace R-1. Replace C-3 or C-4. Replace F-2 or F-9. Replace T-2 or T-3. Replace V-1. Replace L-1 or L-2.
2. Low reading on RF BIAS meter M-2.	2. Tube V-1 defective	2. Replace V-1.
3. High reading on RF BIAS meter M-2.	3. Choke L-1 or L-2 shorted. Resistor R-6 open.	3. Replace L-1 or L-2. Replace R-6.
4. Excess ripple as indicated by hum on received signal from transmitter	4. Capacitor C-3 or C-4 open. Choke L-1 or L-2 shorted.	4. Replace C-3 or C-4. Replace L-1 or L-2.

e. Localizing Trouble in 12-Volt Supply (figs. 62 and 63).

Symptom	Probable trouble	Correction
1. No output.	1. Fuse F-6 or F-11 blown. Defective rectifier unit CR-1. Capacitor C-1 or C-2 shorted. Defective transformer T-1.	1. Replace F-6 or F-11. Replace CR-1. Replace C-1 or C-2. Replace T-1.
2. Output voltage too low.	2. Primary tap setting on transformer T-1 incorrect.	2. Change to proper tap setting.
3. Rectifier operating correctly but no voltage at terminals marked POS and NEG on main terminal board.	3. Fuse F-4 blown.	3. Replace F-4.

Note. In order to operate the rectifier without any other equipment, it is necessary to connect a jumper between the

terminals marked INTERLOCK on the main terminal board. This completes the interlock circuit.

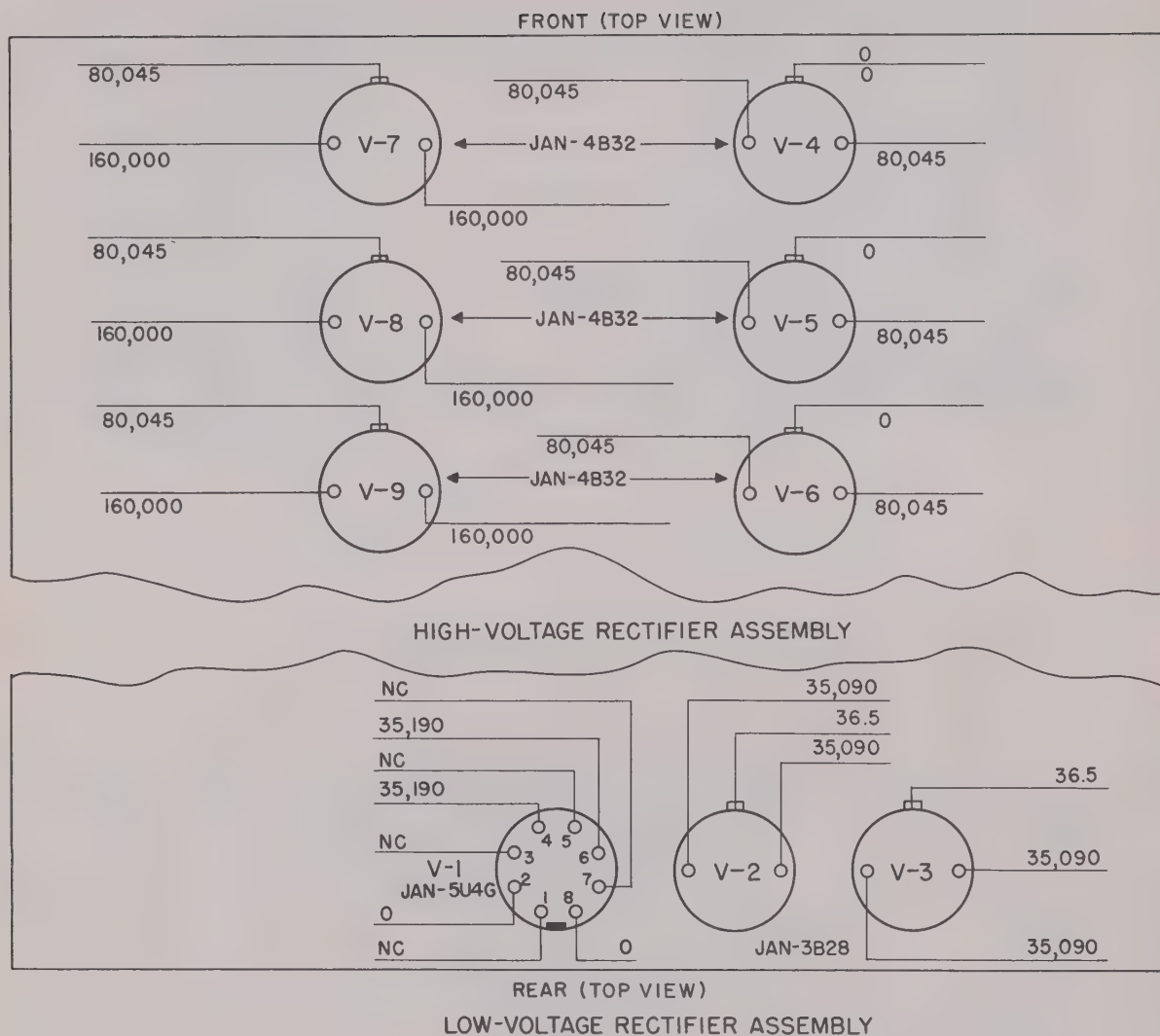


Figure 64. Rectifier Power Unit Model 36D, tube socket resistance diagram

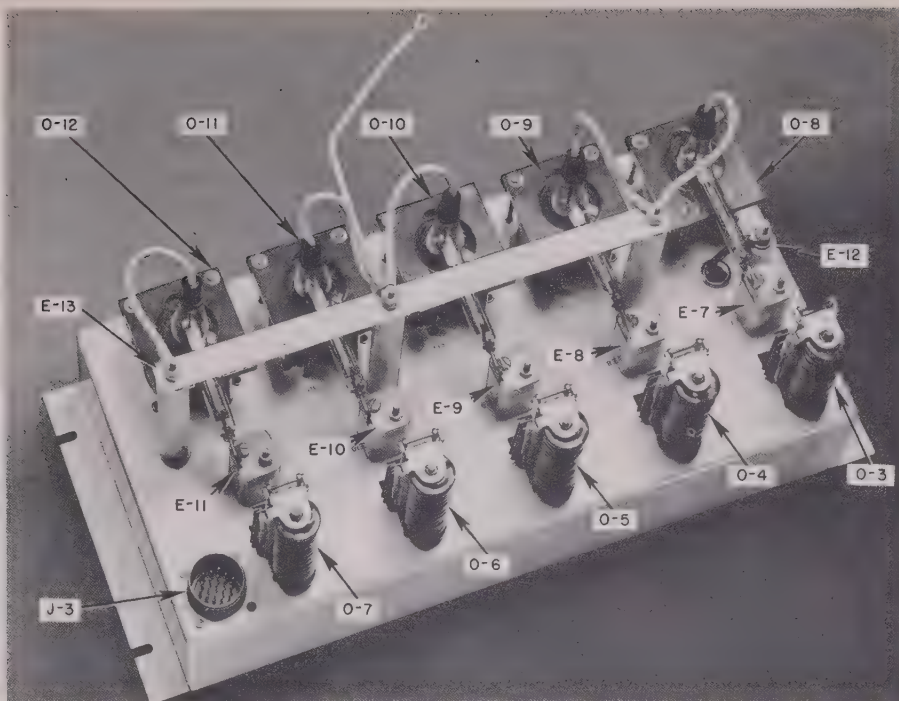


Figure 65. Rectifier Power Unit Model 36D, top view
high-voltage switching unit

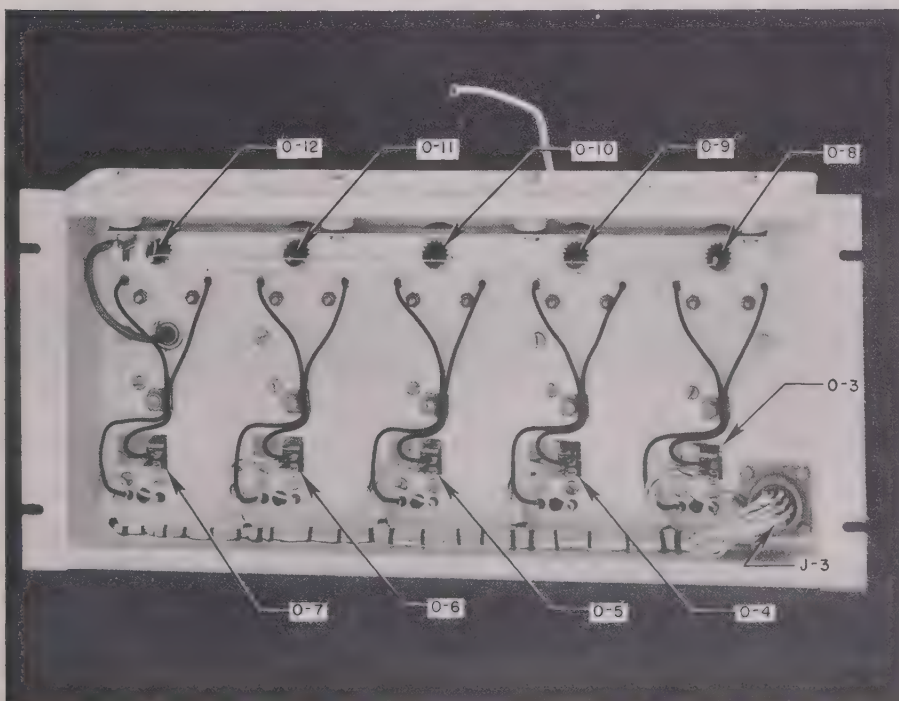


Figure 66. Rectifier Power Unit Model 36D, interior of
high-voltage switching unit

f. Localizing Trouble In H-V Switching Unit (figs. 65 and 66).

Symptom	Probable trouble	Correction
1. No -4,200 volts on any of terminals E-7 through E-11.	1. H-v rectifier not operating. Relays 0-8 through 0-12 faulty. Lead between E-4 and E-13 faulty.	1. Refer to par. 78a. Repair or replace relays 0-8 through 0-12. Check continuity.
2. No modulated +4,200 volts on any one of terminals E-7 through E-11 when a transmitter is selected for that use.	2. One of relays 0-3 through 0-7 defective. One of vacuum relays 0-8 through 0-12 defective. Modulator defective. No 12-volt supply.	2. Repair or replace defective relay. Repair modulator. Refer to paragraph 78e.
3. When one of relays 0-8 through 0-11 is operated, high arc at contacts plus smoking.	3. Vacuum lost in one of relays 0-8 through 0-11, due to cracked envelope or seal.	3. Replace defective relay.

79. Additional Resistance Measurements for Trouble Shooting

a. Transmitter.

Terminal Strip, connector, or relay	Terminals	Ohms
E-8	1-GND	Zero
	2-12	Zero
	4-5	Zero
	7-GND	437,000
	8-9	Zero
	10-GND	Open circuit
	11-2	Open circuit
J-2	C-GND	18,000
	A-GND	18,000
	H-GND	800
	O-GND	825
	V-N	100,000
	V-GND	Open circuit

a. Transmitter (contd).

Terminal Strip, connector, or relay	Terminals	Ohms
	L-GND	446,000
	L-Z	4
	T-GND	47,000
	J-K	Zero
	D-E	Zero
	G-GND	0.2
	U-GND	537,000
	R-GND	537,000
	P-GND	437,000
	B-GND	Open circuit
	S-GND	65,000
	W-GND	65,000
	M-GND	Zero
P-2	All terminals to ground	Open circuit
0-1	--	70
0-2	--	70
0-3	--	10,000
0-4	--	70
0-5	--	450

Note. The above measurements are taken with a-c line switch S-7 closed, high-voltage switch S-12 in, and all interlock closed.

b. Rectifier.

Connector	Terminals	Ohms
J-1	G-H	35,000
	E-H	35,000
	A-B	Zero
	K-J	Zero
	P-L	Zero

b. Rectifier (contd).

Connector	Terminals	Ohms
	F-N	Zero
	M-C	Zero
	All terminals except G and E to ground	Open circuit
J-3	L-M	Zero
	U-N	Zero
	Y-P	Zero
	S-R	Zero
	G-F	Zero
	H-E, D, C, B, A	Zero
	K-H	Open circuit
P-3	All terminals to ground	Open circuit
P-1	All terminals except G, H, and E to ground	Open circuit
	G-GND	800,000
	E-GND	800,000
	H-GND	Zero
0-1	--	70
0-2	--	450
0-3 through 0-7	--	200 each
0-8 through 0-12	--	30 each
K-2	--	670
K-3	--	54

SECTION III. REPAIRS

80. Replacement of Parts

a. Most of the parts in Radio Transmitter Model 96D and Rectifier Power Unit Model 36D are readily

accessible and are easily replaced (par. 69a) if found to be faulty. If any of the relays, switches, or transformers require replacement, mark the wires connected to the faulty unit with tags or other devices to avoid misconnection when a new unit is installed. Follow this practice whenever replacement requires the disconnection of numerous wires.

b. When the slide in the transmitter is pulled out, and the dust cover is removed from the rear of the fuse and relay panel (figs. 8 and 28), all the components within the slide are accessible. Opening the fuse and relay panel doors and the control panel doors makes it easy to remove these components. With exception of the exciter unit, fuses, relays, controls, and meters, the components of the final amplifier, the antenna loading network, and the third amplifier plate circuit are bolted to the left panel of the slide. The exciter unit is secured to the bottom front of the slide and is removable when the slide is opened. Access to the mounting bolts for the relays and control is from the inside of the slide.

c. In the rectifier, the h-v rectifier chassis, the l-v chassis, the h-v switching unit, and the blower assembly are readily removed from the rectifier cabinet (par. 69b). The only necessary operation is to remove the screws that hold the various chassis in place, disconnect cables, and remove the chassis. Access to the front of the fuse, control and relay panels is obtained by opening the doors covering these units. To get to the rear of these panels, remove the l-v rectifier chassis. The front of the main terminal board is exposed when the protecting door is opened. To get to the rear of the main terminal board, remove the blower assembly.

81. Refinishing

When the equipment is disassembled, and before the installation of the component parts, is the best time to do the refinishing required.

82. Apparatus Adjustment

The rectifier has no components that require adjustment. In the transmitter there are four drives from the controls

to the operating components. Each one of these drives has a counter which is used during the tuning procedure. The proper setting for each counter is that when the counter reads "0000", the operating unit is at its minimum coupling or minimum frequency position. This minimum coupling or frequency position occurs when the capacitor plates are fully meshed and the antenna tuning coil is as far away from the plate coil as practical. To make these adjustments, proceed as follows:

a. Third Amplifier Plate and Antenna Tuning Controls. Rotate the control counterclockwise until the tuning capacitor is fully meshed. The counter should read "0000". If it does not, loosen the two setscrews in the counter drive gear, rotate the counter to make it read "0000", and tighten the counter drive gear setscrews. The gear should be positioned on the shaft to give a small amount of backlash between it and the counter driven gear. The position of the dog washer collar should allow approximately one turn counterclockwise of the control knob past the zero position before the shaft stop is reached. If it does not, loosen the two setscrews in the collar, holding it with enough pressure against the stack of dog washers to keep them from spreading. Turn the control knob about one turn counterclockwise past zero. Keeping moderate pressure on the stack of dog washers, rotate the collar in the corresponding direction as far as it will go, release the pressure on the dog washer stack, and tighten the setscrews. If a thickness gage is available, position the collar on the shaft to allow from 0.008 inch to 0.012 inch clearance between it and the tightly compressed stack. Rotate the control knob until the counter reads "0500" and check to see that the capacitor is fully open. If the correct number (31) dog washers are on the shaft, the control knob can be rotated about one turn clockwise past "0500" before reaching the stop.

b. Final Amplifier Plate Tuning Con-

trol. Rotate the control counterclockwise until the shaft stop is reached. The counter should read "0000", and, just at or very close to zero, a noticeable decrease in the normal rotational friction of the control should take place. This decrease in friction is a result of the capacitor moving plates reaching the limit of movement and thus removing the thrust from the capacitor actuating screw. This may be checked by noticing that when the counter is at zero, the large metal collar on the shaft end of the tuning capacitor can be rotated easily with the fingers, and, with the control knob rotated clockwise not more than one-eighth turn from zero, the collar becomes definitely more difficult to turn. If the above test shows need of adjustment, loosen the two setscrews in the shaft gear which drives the counter and the shaft stop assembly. Rotate the control until the point is found where the capacitor thrust screw just starts to pull the capacitor plates apart. Do not confuse this point with the point at which the capacitor clockwise rotational stop acts. Without moving the control from this position, set the counter at zero and turn the shaft stop assembly counterclockwise

as far as it will go. Move the drive gear, previously loosened, into mesh with the counter and shaft stop assembly gears, allowing a small amount of backlash. Then tighten the setscrews and check operation as given above.

c. Antenna Coupling Control. Rotate the control counterclockwise until the stop is reached. The counter should read zero and the front end of the antenna coil carriage should be 1 inch plus or minus 1/8 inch from the inner face of the final amplifier coil front plate. If necessary, adjust the forward carriage stop nuts to position the carriage properly. Adjust the counter, as described in paragraph 82a, if required, with the coil carriage against the forward stop. With an antenna coil in place, rotate the control clockwise until the stop is reached. The rear end of the antenna coil form should be approximately flush with the inner face of the final amplifier coil rear plate. If necessary, adjust the rear carriage stop nuts to obtain this result. The control shaft and nuts have left-hand threads, therefore rotate the shaft stop nuts accordingly when loosening or tightening.

CHAPTER 6

SHIPMENT AND LIMITED STORAGE

SECTION I. SHIPMENT AND LIMITED STORAGE

83. Disassembly

The following instructions are recommended as a guide for preparing the radio equipment for transportation and storage.

a. External Lines. Disconnect all antennas, control and keying lines, and power lines. Reel up all lines on suitable reels.

b. Transmitter. Pull the slide out of the cabinet. Remove the bolts that secure the cabinet to the floor. Replace the slide and lock in position.

c. Rectifier. Disconnect the plugs on the high- and low-voltage rectifier chassis and the h-v switching unit. Disconnect the leads from the terminals of the h-v transformer and the stand-off insulators on the shelf next to the h-v switching unit and the leads on the h-v switching unit. Disconnect the leads to the blower motor. Remove the bolts

holding the high- and low-voltage rectifier chassis, the h-v switching unit, and the blower assembly. Remove the units. Note that before the h-v rectifier chassis can be removed, the h-v leads must be disconnected from the terminals within the chassis.

84. Repacking for Shipment or Limited Storage

a. The exact procedure in repacking for shipment or limited storage depends upon the material available and the conditions under which the equipment is to be shipped or stored. Refer to paragraph 13 and follow in reverse order the instructions given.

b. Whenever practicable, place a dehydrating agent such as silica gel inside the cases. Protect the cabinets with a waterproof paper barrier. Seal the seams of the paper barrier with a waterproof compound or tape. Pack the protected cases in a padded wooden case, providing at least 3 inches of excelsior padding or some similar material between the paper barrier and packing case.

ABBREVIATIONS

a-c	alternating-current
a-f	audio-frequency
a-m	amplitude-modulated
amp	ampere
cps	cycles per second
c-w	continuous-wave
d-c	direct-current
h-f	high-frequency
h-v	high-voltage
K	1,000 ohms
kc	kilocycle
kva	kilovolt-ampere

kw	kilowatt
l-f	low-frequency
l-v	low-voltage
ma	milliampere
mc	megacycle
mcw	modulated continuous-wave
meg	megohm
PM	preventive maintenance
r-f	radio-frequency
uf	microfarad
uuf	micromicrofarad
v	volt

Symbol	Name of part and description	Function of part
	TRANSMITTER, radio: Wilcox Model 96D: CW, MCW, AM, and teletypewriter: 2-26 mc; 2500 w output; input 4200 v at 0.85 amp, 2100 v at 0.175 amp, 525 v at 0.1 amp, -450 v at 0.04 amp, 220 v AC at 3.0 amp; mtd in metal cabinet 72" h x 12-5/16" wd x 24-1/2" d; crystal-controlled; u/w Rectifier Power Unit Model 36D; includes teletypewriter input connection.	
C-1, C-3, C-4, C-10, C-18, C-19, C-22, C-23	CAPACITOR, fixed: mica; JAN CM35B103K; spec JAN-C-5.	C-1: Oscillator heater bypass. C-3: Oscillator suppressor grid r-f bypass. C-4: First amplifier cathode bypass. C-10: Second amplifier grid return bypass. C-18: Third amplifier filament bypass. C-19: Third amplifier filament bypass. C-22: Keying tube grid (#1) return bypass. C-23: Keying tube plate (#2) filter.
C-2, C-5, C-6, C-12, C-21	CAPACITOR, fixed: mica; JAN CM30B102K; spec JAN-C-5.	C-2: Oscillator screen supply bypass. C-5: First amplifier grid coupling. C-6: First amplifier screen bypass. C-12: Second amplifier screen bypass. C-21: Keying tube grid (#1) filter.
C-7, C-14	CAPACITOR, variable: air dielectric; plate meshing type; 13-242 mmf; air gap 0.030"; 1-1/2" x 1-1/2" x 3-13/32" lg excluding shaft; one solder lug terminal on rear end plate; two 5/32" holes on 3-11/16" mtg/c; 51 aluminum plates; ceramic ins; 3/8"-32 x 3/8" lg shaft bushing; shaft 1/4" diam x 5/8" projection beyond bushing; Johnson EF #156-7-5; Wilcolec part #15116.	C-7: 1ST AMP PLATE TUNING capacitor. C-14: 2ND AMP PLATE TUNING capacitor.
C-8, C-9, C-13, C-15, C-16, C-17, C-20, C-31, C-32, C-33, C-34, C-40	CAPACITOR, fixed: mica; JAN MC45B102K; spec JAN-C-5.	C-8: Second amplifier grid coupling. C-9: First amplifier plate supply filter. C-13: Third amplifier grid coupling. C-15: Second amplifier plate supply filter. C-16 and C-17: Third amplifier grid return bypass. C-20: Third amplifier screen bypass. C-31 through C-34: Final amplifier filament bypass. C-40: Final amplifier grid return bypass.

C-11	CAPACITOR, fixed: mica; JAN CM35B512J; spec JAN-C-5.	Tone keying transformer filter.
C-24	CAPACITOR, fixed: mica; JAN CM20B271K; spec JAN-C-5.	Channel control grid filter.
C-25, C-29	CAPACITOR, fixed: mica; JAN CM70B202J; spec JAN-C-5.	C-25: Third amplifier plate coupling. C-29: Third amplifier plate supply filter.
C-26	CAPACITOR, variable: air dielectric; plate meshing type; dual sect; 26-290 mmf per sect; 0.125" air gap; 5-1/2" wd x 6-3/4" h x 11-3/8" lg excluding shaft; stainless steel shaft 1/4" diam x 1-1/2" projection; four 7/32" mtg holes on 4" x 9-29/32" mtg/c with two 7/32" holes 2" apart approx centered between end holes; 21 polished aluminum plates per sect; silicone-treated ceramic ins; p/o Radio Transmitter Model 96D; worm drive mtd on shaft end, 50 to 1 ratio; Wilcolec part #15117.	3RD AMP plate tuning.
C-27	CAPACITOR, variable: air; neutralizing, concentric type; 10-18 mmf; 0.750" spacing; 12-1/4" lg x 3-13/16" wd x 4-13/32" d; 2 cup type polished aluminum plates; two #8-32 stud term; two 17/64" diam holes on 7" mtg/c; mycalex ins; 1/4" diam x 1/2" lg adjusting shaft at 90 deg to main adjusting shaft; includes 2 miter gears and mtg bracket attached to capacity adjusting shaft; p/o Radio Transmitter Model 96D; Wilcolec part #15134.	Final amplifier NEUTRALIZING capacitor.
C-28	CAPACITOR, fixed: paper; JAN CP69B1DG504K; spec JAN-C-25.	Bias isolator filament bypass.
C-30, C-35	CAPACITOR, fixed: mica; JAN CM80B202J; spec JAN-C-5.	C-30: Final amplifier plate supply filter. C-35: Final amplifier plate blocking.
C-36	CAPACITOR, variable: vacuum; plate meshing type; 50-250 mmf; 15,000 v peak; 5" diam x 10-5/8" lg overall; shaft 1/4" diam x 7/16" lg; nonlocking; variable axially; 2 ferrule terminals for mtg and cont; 2" diam x 7/8" wd on 6-3/8" mtg/c; Wilcolec part #15128.	FINAL AMP PLATE tuning.
C-37, C-38	CAPACITOR, fixed: vacuum; 100 mmf; 20,000 v peak; 4-3/16" lg x 2-1/4" diam overall; 2 ferrules for term and mtg 11/32" diam x 9/32" wd on ends; JenningsRad #W-100; Wilcolec part #15129.	Final amplifier plate trimming and padding capacitors.
C-39	CAPACITOR, variable: air; plate meshing type; dual sect; 37-305 mmf per sect; 0.175" air gap; 18-3/4" lg x 5-1/2" wd x 5-1/2" d; 1/4" diam x 1/2" lg extension shaft adjustment; 29 polished aluminum plates per sect; 360 deg rotation;	ANTENNA TUNING capacitor.

1. Identification Table of Parts for Radio Transmitter Model 96D

Symbol	Name of part and description	Function of part
C-41, C-42	tion; ceramic ins; stud terminals; four 7/32" diam holes on 17-5/16" x 2-7/8" mtg/c; worm drive mtd on shaft end, 50 to 1 ratio; p/o Radio Transmitter; Model 96D; Wilcolec part #15130.	Crystal padding capacitors.
H-1	CAPACITOR, fixed: mica; JAN CM20C470J; spec JAN-C-5. CLAMP: Cable; Army-Navy #3057-28; aluminum black anodized; two bolts used; 2-1/2" diam x 1-9/16" lg; for 1-13/16" max diam cables; Wilcolec part #94203. CLEANER ELEMENT, air: crimped screen wire; reusable; 19-1/2" lg x 9-9/16" wd x 2" thk; with cleaning instructions and handle on ends; for Radio Transmitter Model 96D; Air-Maze; Wilcolec part #63008.	
O-10	CLIP: fuse; silver pl beryllium copper; 7/16" lg x 15/32" wd x 3/4" h; for 13/32" diam ferrules; 30 amp 250 v; Littell fuse #125001; Wilcolec part #27539.	
O-11	CLIP: fuse; silver pl beryllium copper; 5/8" lg x 15/32" wd x 3/4" h; for 13/32" diam ferrules; with solder lug; 30 amp 250 v; Littell fuse #125004; Wilcolec part #27539.	Oscillator plate shunt peaking choke.
O-12	CLIP: fuse; copper; 9/16" lg x 11/16" wd x 3/4" h; for 9/16" diam ferrules; 30 amp 250 v; square D #SK2371; Wilcolec part #27503.	
O-13	CLIP: fuse; copper; 11/16" lg x 1" wd x 1" h; for 13/16" diam ferrules; 60 amp 250 v; square D #SK2372; Wilcolec part #27504.	
L-1	COIL, RF: osc choke; single pie winding; unshielded; 55 turns #28 DSC copper wire; 45 uh at 2 meg; 1-9/16" h x 1-1/2" lg x 3/4" wd overall; phenolic form, solid; form 3/8" d x 1-1/8" lg; #6-32 x 3/8" d mtg hole; 4 solder lug on term board attached to one end of coil; vacuum impregnated and fungus treated; p/o Radio Transmitter Model 96D; Wilcolec part #38595.	First amplifier plate tuning.
L-2	COIL, RF: 1st amplr plate; four windings, single layer, 11 turns #20 AWG, 11 turns #22 AWG, 14 turns #24 AWG, 36 turns #22 AWG; rect aluminum shield can 2-1/4" wd x 4-3/4" lg x 4-7/8" h overall; steatite form;	

built-in tuning capacitor and 4 position band switch; slotted ins capac shaft and slotted switch shaft proj at bottom; two #6-32 holes on 4-5/32" mtg/c; 4 solder term on bottom; impregnated for tropical use; p/o Radio Transmitter Model 96D; Wilcolec part #42043.

L-3

COIL, RF: 2nd amplr plate; four windings, single layer, 11 turns #20 AWG, 11 turns #22 AWG, 14 turns #24 AWG, 36 turns #22 AWG; rect aluminum shield can; 2-1/4" wd x 4-3/4" lg x 4-7/8" h overall; steatite form; built-in tuning capacitor and 4-position band switch; slotted insulated capacitor shaft and slotted switch shaft proj at bottom; two #6-32 holes on 4-5/32" mtg/c; 3 solder term on bottom and plate lead out side of shield; impregnated for tropical use; p/o Radio Transmitter Model 96D; Wilcolec part #42043.

L-4

COIL, RF: choke; 3d amplr grid; single winding, single layer wound; unshielded; 395 uhy at 500 kc; 3-5/8" lg x 3/4" diam; phenolic form, air core; one #6-32 mtg hole one end; 2 solder term; fungusproofed; p/o Radio Transmitter Model 96D; Wilcolec part #38615.

L-5

COIL, RF: choke; 3d amplr parasitic; single winding, single layer wound; unshielded; 4 turns #14 AWG wire; 2-1/4" lg x 1" diam; 3/4" diam 1" lg steatite form; #10-32 stud each end for mtg and term; fungusproofed; p/o Radio Transmitter Model 96D; Wilcolec part #38597.

L-6A,
L-9A,
L-12A

COIL, RF: choke; single winding, single layer wound, 2.0-6.5 mc; 760 uhy at 800 kc; 410 turns #28 AWG wire; unshielded; 7-1/2" lg x 1-1/8" diam; 1" diam x 6" lg steatite form; 9/16" diam x 1/2" lg mtg ferrule terminals each end; p/o Radio Transmitter Model 96D; Wilcolec part #38598.

L-6B,
L-9B,
L-12B

COIL, RF: choke; single winding, single layer wound; 6.5-18.0 mc; 80 uhy at 2.0 mc; 115 turns #20 AWG wire; unshielded; 7-1/2" lg x 1-1/8" diam; 1" diam x 6" lg steatite form; 9/16" diam x 1/2" lg mtg ferrule terminals each end; p/o Radio Transmitter Model 96D; Wilcolec part #38599.

L-6C,
L-9C,
L-12C

COIL, RF: choke; single winding, single layer wound, 18.0-26.0 mc; 31.6 uhy at 2.0 mc; 60 turns #18 polyvar wire close wound; unshielded; 7-1/2" lg x 1-1/8" diam; 1" diam x 6" lg steatite form; 9/16" diam x 1/2" lg mtg ferrule terminals each end; p/o Radio Transmitter Model 96D; Wilcolec part #38614.

Second amplifier plate tuning.

Third amplifier grid return filter.

Third amplifier plate parasitic suppressor.

L-6A: 2.0-6.5 mc. Third amplifier plate supply filter.
L-9A: 2.0-6.5 mc. Final amplifier plate supply filter.
L-12A: 2.0-6.5 mc. Final amplifier grid filter.

L-6B: 6.5-18 mc. Third amplifier plate supply filter.
L-9B: 6.5-18 mc. Final amplifier plate supply filter.
L-12B: 6.5-18 mc. Final amplifier grid filter

L-6C: 18-26 mc. Third amplifier plate supply filter.
L-9C: 18-26 mc. Final amplifier plate supply filter.
L-12C: 18-26 mc. Final amplifier grid filter.

1. Identification Table of Parts for Radio Transmitter Model 96D

Symbol	Name of part and description	Function of part
L-7A	COIL, RF: Third amplr plate; 2.0-3.6 mc; one winding; single layer wound; unshielded; 40 turns #14 AWG wire CT; 5-3/8" lg x 3-3/4" wd x 4" h; 5" lg x 2-1/2" diam coil form, air core; four mtg term slotted 1/4" wide on 4-3/8" x 3" ctrs, nonsymmetrical; fungusproofed; p/o Radio Transmitter Model 96D; Wilcolec part #42000.	Third amplifier plate tuning (2.0-3.6 mc).
L-7B	COIL, RF: Third amplr plate; 3.6-7.0 mc; one winding; single layer wound; unshielded; 20 turns #12 AWG wire CT; 5-3/8" lg x 3-3/4" wd x 4" h; 5" lg x 2-1/2" diam coil form, air core; four mtg term slotted 1/4" wide on 4-3/8" x 3" ctrs, nonsymmetrical; fungusproofed; p/o Radio Transmitter Model 96D; Wilcolec part #42001.	Third amplifier plate tuning (3.6-7.0 mc).
L-7C	COIL, RF: Third amplr plate; 7.0-10.0 mc; one winding; single layer wound; unshielded; 13 turns #10 AWG wire, tapped at 7 turns; 5-3/8" lg x 3-3/4" wd x 4" h; 5" lg x 2-1/2" diam coil form, air core; four mtg term slotted 1/4" wide on 4-3/8" x 3" ctrs, nonsymmetrical; fungusproofed; p/o Radio Transmitter Model 96D; Wilcolec part #42002.	Third amplifier plate tuning (7.0-10.0 mc).
L-7D	COIL, RF: Third amplr plate; 10.0-14.0 mc; one winding; airwound single layer; unshielded; 12 turns 3/16" diam copper tubing, tapped at 1-3/4 and 6 turns; 5-3/8" lg x 3-3/4" wd x 3-1/2" h; four 2-1/8" x 1/2" x 1/16" thk silver pl mtg and term straps slotted 1/4" wd x 1/4" d on 3" x 4-3/8" mtg/c; coil and term attached to 5-5/16" lg x 1-1/2" wd x 1/8" thk steatite base plate; fungusproofed; p/o Radio Transmitter Model 96D; Wilcolec part #42003.	Third amplifier plate tuning (10.0-14.0 mc).
L-7E	COIL, RF: Third amplr plate; 14.0-18.0 mc; one winding; air wound single layer; unshielded; 8 turns, 1/4" diam copper tubing, tapped at 1 and 3 turns, 5-3/8" lg x 3-3/4" wd x 3-7/8" h; four 2-1/8" x 1/2" x 1/16" thk silver pl mtg and term straps slotted 1/4" wd x 1/4" d on 3" x 4-3/8" mtg/ctrs; coil and term attached to 5-5/16" lg x 1-1/2" wd x 1/8" thk steatite base plate; fungusproofed; p/o Radio Transmitter Model 96D; Wilcolec part #42004.	Third amplifier plate tuning (14.0-18.0 mc).
L-7F	COIL, RF: Third amplr plate; 18.0-22.0 mc; one winding; same as coil L-7E but 6 turns tapped at 1/2 and 2-5/8 turns; p/o Transmitter Model 96D; Wilcolec part #42102.	Third amplifier plate tuning (18.0-22.0 mc).

L-7G	COIL, RF: Third amplr plate; 22.0-26.0 mc; one winding; similar to coil L-7E but 7 turns 1/4" copper tubing 2" o. d., tapped at 7/8 and 3 turns; p/o Radio Transmitter Model 96D; Wilcolec part #42044.	Third amplifier plate tuning (22.0-26.0 mc).
L-8	COIL, RF: choke; final amplr parasitic; single winding; single layer wound; unshielded; 2 turns #14 AWG wire, 2-1/4" lg x 1" diam; 3/4" diam x 1" lg steatite form; #10-32 stud each end for mtg and term; fungusproofed; p/o Radio Transmitter Model 96D; Wilcolec part #38600.	Final amplifier grid parasitic.
L-10	COIL, RF: final amplr plate; single winding; airwound single layer wound; unshielded; 14 turns 1/4" diam copper tubing, tapped at 3, 5, 7, 10, 11, 12, 13-1/16" turns; 13-1/2" lg x 8-1/2" wd x 6-3/4" h overall; steatite framework, two glazed end plates supporting four silicon treated 1" x 1/4" x 12" bars slotted for coil winding; air core; four 7/32" diam holes on 12-7/32" x 3-13/16" mtg/c; eight #10-32 stud term; includes carrier rod for L-11; p/o Radio Transmitter Model 96D; Wilcolec part #42077.	Final amplifier plate tuning.
L-11A	COIL, RF: antenna; 2.0-3.6 mc; single winding, single layer wound; unshielded; 26 turns #14 AWG wire, 4-3/4" lg x 3-1/8" diam overall; steatite form; air core; two 3/16" x 3/8" d slots on 1-19/32" ctrs in two silver pl mtg and term brackets, L-shaped 9/16" x 9/16" x 1-1/4" lg x 1/16" thk; fungusproofed; p/o Radio Transmitter Model 96D; Wilcolec part #42006.	ANTENNA COUPLING (2.0-3.6 mc)
L-11B	COIL, RF: antenna; 3.6-6.5 mc; single winding; single layer wound; unshielded; 12 turns #16 AWG wire, 4-3/4" lg x 3-1/8" diam overall; steatite form, air core; mounting dimen same as L-11A; fungusproofed; p/o Radio Transmitter Model 96D; Wilcolec part #42007.	ANTENNA COUPLING (3.6-6.5 mc).
L-11C	COIL, RF: antenna; 6.5-10.0 mc; single winding, single layer wound; unshielded; 7 turns #10 AWG wire, 4-3/4" lg x 3-1/8" diam overall; steatite form, air core; mounting dimensions same as L-11A; fungusproofed; p/o Radio Transmitter Model 96D; Wilcolec part #42007.	ANTENNA COUPLING (6.5-10.0 mc).
L-11D	COIL, RF: antenna; 10.0-18.0 mc; single winding, single layer wound; unshielded; 4 turns #10 AWG wire, 4-3/4" lg x 3-1/8" diam overall; steatite form, air core; mounting dimensions same as L-11A; fungusproofed; p/o Radio Transmitter Model 96D; Wilcolec part #42009.	ANTENNA COUPLING (10.0-18.0 mc).

1. Identification Table of Parts for Radio Transmitter Model 96D

Symbol	Name of part and description	Function of part
L-11E	COIL, RF: antenna; 18.0-26.0 mc; single turn 1/2 hard yellow brass band, 1/2" wide x .064" thick, 4-5/8" diameter; formed to fit inside coil L-10; p/o Radio Transmitter Model 96D; Wilcolec part #42048.	ANTENNA COUPLING (18.0-26.0 mc).
J-1, J-3, J-5	CONNECTOR, receptacle: Sig C #SO-239.	
J-2	CONNECTOR, receptacle: 23 contact; Army-Navy #AN3102-40-2P.	
J-4	CONNECTOR, receptacle: Sig C #SO-39.	
P-1, P-3	CONNECTOR, plug: Sig C #PL-259.	
P-2	CONNECTOR, plug: 23 contact; Army-Navy #AN3106-40-2S.	
I-1	COUNTER, mechanical: geared drive; polished metal case; 1-3/8" h x 1-1/2" wd x 13/16" d; 4 digits; nonresetting; counterclockwise rotation; max speed 100 rpm; subtracts in opposite direction; two 0.120" diam holes on 1-1/8" ctrs; flange-at-window type case; includes 18-tooth bevel pinion; Wilcolec part #35089.	
Y-1	CRYSTAL UNIT, quartz: single plate 3 pins on bottom spaced 1/2" x 13/16" ctrs; hollow pins 5/32" diam x 1/2" lg; connections to pins 2 and 3; for Radio Transmitter Model 96D; Hunt Corp; Wilcolec part #47385.	Frequency determining.
Y-1	CRYSTAL UNIT, quartz; (optional type); one or two plates in dual holder; holder type 5H; for Radio Transmitter Model 96D; Wilcolec part #47400.	Frequency determining.
F-1 F-2, F-3, F-4	FUSE, cartridge: 1 amp; 250 v; carry 110%, open at 135% in 1 hr; open at 200% in 30 seconds; one time; fibre body; ferrule term; nonindicating; 13/32" diam x 1-1/2" overall; ferrules 13/32" diam x 3/8" lg; Bussman #BAF-1; Wilcolec part #14088.	F-1 and F-2: Protection of exciter filter transformer. F-3 and F-4: Protection of third amplifier filament transformer.
F-5 F-6	FUSE, cartridge: 2 amp; 250 v; carry 110%, open at 135% in one hr; open at 200% in 30 sec; one time; fibre body; ferrule term; nonindicating; 13/32" d x 1-1/2" overall;	Protection of final amplifier filament transformer.

F-7, F-8	ferrules 13/32" diam x 3/8" lg; Bussman #FNM-2; long time-long; Wilcolec part #14086.	Protection of blower motor and channel contactor (05).
F-9, F-10	FUSE, cartridge: 2.5 amp; 250 v; carry 110%, open at 135% in 1 hr, open at 200% in 25 sec; one time; fibre body; ferrule term; nonindicating; 13/32" diam x 1-1/2" lg; ferrules 13/32" diam x 3/8" lg; long time-lag; UL approved; Bussman #FNM-2.5; Wilcolec part #14085.	F-9: Protection of (-450volt) supply. F-10: Protection of (+525volt) supply.
F-11	FUSE, cartridge: 0.5 amp; 1000 volt; opens in one hr at 135% load; carries 110% for 2 hr; opens in 30 sec at 200%; one time; fibre body; ferrule term; 13/32" diam x 3" lg; Bussman #HVA-0.5; Wilcolec part #14054.	Protection of 2, 100 volt supply.
F-12	FUSE, cartridge: 3/4 amp; 2500 volt; opens in one hr at 135% load; carries 110% for 2 hr; opens in 30 sec at 200%; one time; fibre body; ferrule term; 13/32" diam x 4-1/2"; Bussman #HVB-0.75; Wilcolec part #14082.	Protection of 4, 200 volt supply.
W-1	FUSE, cartridge: 1-1/2" amp; 5000 v; carry 110%, open at 135% in 1 hr; one time; nonindicating; fibre body; ferrule terms; 13/16" diam x 5" lg; 13/16" diam x 9/16" lg ferrule; Bussman #HVJ-1.5; Wilcolec part #14091.	Short turns on the final amplifier tuning coil.
E-9	LEAD, electrical: final amplr plate tuning link; 0.064" silver pl brass L-bracket 1-1/8" x 1/2 x 1/2"; two 3/8" diam x 3/8" lg cylindrical silver pl brass term at 90°; 1-1/2" lg x 7/8" h x 1/2 d overall; Wilcolec part #26391.	
E-1, E-2, E-5, E-6	HOLDER, fuse: panel mtg post type; for 13/32" diam x 1-1/2" lg cartridge fuse; molded phenolic; 15 amp, 250 v; 2-7/16" lg x 1-3/4" wd x 1-1/8" thk; mts in 7/8" d hole with one 11/64" diam hole each side on 1-15/16" mtg/ctr; two solder terms; screw cap; Buss #HPC; Wilcolec part #27537.	
E-1 E-2, E-5, E-6	INSULATOR, bushing: truncated cone with hub; JAN NS4W4104; spec JAN-I-8.	
E-1 E-2, E-5, E-6	INSULATOR, bushing: hollow truncated cone; JAN NS4W4204; spec JAN-I-8.	
	INSULATOR, standoff: round post shape JAN NS4W0308; spec JAN-I-8.	

1. Identification Table of Parts for Radio Transmitter Model 96D

Symbol	Name of part and description	Function of part
E-3, E-4	INSULATOR, standoff: round post shape; JAN NS4W0106; spec JAN-I-8.	
	INSULATOR, standoff: round post shape; JAN NS4W0316; spec JAN-I-8.	
	INSULATOR, standoff: round post shape; JAN NS4W0332; spec JAN-I-8.	
	INSULATOR, standoff: round post shape; JAN NS4W0412; spec JAN-I-8.	
	INSULATOR, standoff: round post shape; JAN NS4W0424; spec JAN-I-8.	
	INSULATOR, standoff: round post shape; JAN NS4W0440; spec JAN-I-8.	
	INSULATOR, standoff: cone shape; JAN NS4W2012; spec JAN-I-8.	
	KNOB: round; black anodic aluminum; for 1/4" diam shaft; two #6-32 set screws; 1/8" diam stainless steel indicating pin near edge; 3/8" d shaft hole; straight knurled; p/o Radio Transmitter Model 96D; Wilcolec part #60236. KNOB: round; black anodic aluminum; for 1/4" diam shaft; two #6-32 set screws; 5/16" diam x 9/16" lg crank projecting near edge; 3/8" d shaft hole; straight knurled; p/o Radio Transmitter Model 96D; Wilcolec part #60235.	Indicates final amplifier total current.
M-1	METER, ammeter: DC; JAN MR36W002DCAA; spec JAN-I-6.	Multiscale.
M-2	METER, multiscale 0-5/25/250/500/ ma; DC; JAN MR36-W001-DCMA; spec JAN-I-6.	Operate blower fan.
B-1	MOTOR, AC; single phase type; 1/6 hp, 1725 rpm; open frame, dripproof; continuous duty at ambient temp -55°C to +85°C up to 10,000 ft altitude; 5/8" OD shaft x 2" lg one end; 8-5/8" lg excluding shaft x 7-3/4" wd x 6-11/16" h; 230 volt 60 cps; resilient mtg base; 4 mtg holes on 3" x 4-7/8" ctrs; ball bearing; fungus treated per spec JAN-T-152; Leland Elec #SD739/84014-2; Wilcolec part #45626; p/o Radio Transmitter Model 96D.	

O-1, O-2	RELAY, armature: DPDT; contrasting 10 amp noninductive; 3/16" diam silver cont; double coil, 70 ohms, 12 volt; 7.5 v DC oper, term on coil and cont; 1-5/8" wd x 1-25/32" lg x 1-15/16" h; four #6-32 mtg holes on 1-5/16" x 1/2" ctrs; -55° to +85°C ambient temp; moisture-and fungus-treated per JAN-T-152; Phillips Control #A27Q-A22H2; Wilcolec part #11736.	O-1: Overload protection. O-2: Underload (or modulator control) protection.
O-3	RELAY, armature: SPST; no double break; cont rating 20 amp noninductive; 1/4" diam silver cont; double coil, 10,000 ohms 90 volts; nominal, release at 70% of operating voltage; solder lug term on coil and cont 1-5/8" w x 1-5/8" lg x 1-7/8" h; four #6-32 mtg holes on 1-5/16" x 1/2" ctrs; -55° to +85°C ambient temp; moisture-and fungus-treated per JAN-T-152; Phillips #A27QA25K2; Wilcolec part #11748.	Channel control.
O-4	RELAY, armature; DPDT; cont rating 20 amp noninductive; 1/4" d. silver cont; double coil, 10,000 ohms, 90 v; solder lug term on coil and cont 1-5/8" wd x 1-5/8" lg x 1-7/8" h; four #6-32 mtg holes on 1-5/16" x 1/2" ctrs; -55° to +85°C ambient temp; moisture-and fungus-treated per JAN-T-152 Phillips #A2QA6N1; Wilcolec part #11747.	Bias protective.
O-5	RELAY, armature: 4PST; normally open; cont silver-palladium 250 v; single coil 205-245 v, 50/60 cps; 450 ohms DC; screw term; 3-5/8" h x 2-3/4" wd x 3-3/8" d; three 3/16" mtg holes on 2-1/4" x 3-1/4", ctrs; fast acting; continuous duty at -55° to +85°C ambient temp up to 10,000 ft altitude; moisture-and fungus-treated; RBM (Essex Wire) #101140; Wilcolec part #11737, includes -- COIL, relay: p/o relay RBM (Essex Wire) #101140; 205-245 v, 50/60 cps; 450 ohms DC; 2 screw term; 1-5/16" x 1-5/8" x 1" overall; hollow rectangle shape; ins; marked "RBM coil 45225-2"; Wilcolec part #11769, and CONTACT ASSEMBLY, relay: fixed; p/o relay RBM (Essex Wire) #101140; 4 sets cont on molded plastic support with screw clamp term; 2-3/4" x 1-3/4" d; eight silver-palladium 3/16" diam cont; RBM #45200-1; Wilcolec part #11767, and CONTACT ASSEMBLY, relay: movable; p/o relay RBM #101140; 4 sets spring-loaded cont on molded plastic carrier; 2-5/16" x 7/8" x 1-11/16" d; eight 3/16" diam silver-palladium cont; RBM #45211-1; Wilcolec part #11768.	Channel operate.

1. Identification Table of Parts for Radio Transmitter Model 96D

Symbol	Name of part and description	Function of part
O-6	RELAY, keying; sensitive type; SPDT; coil 11,700 ohms, 12 dc; Advance Electric type 1200; Wilcolec #11724. (Optional part for Radio Transmitter Model 96D).	Keying Relay.
O-7	RELAY, crystal shift; DPDT; coil 6 v ac 50-60 cycles; Advance Electric type K1504; Wilcolec #11791. (Optional part for Radio Transmitter Model 96D).	Crystal shift relay.
R-1, R-3, R-27, R-38	RESISTOR, fixed: comp; JAN RC30BF104K; spec JAN-R-11.	R-1: Oscillator grid leak. R-3: First amplifier grid leak. R-27: Keying tube plate (#5) load. R-38: Bias isolator filament and grid return.
R-2, R-28, R-29	RESISTOR, fixed: comp; JAN RC30BF274K; spec JAN-R-11.	R-2: Oscillator screen dropping. R-28: Keying tube grid (#1) return. R-29: Keying tube plate (#2) load.
R-4	RESISTOR, fixed: comp; JAN RC30BF271K; spec JAN-R-11.	First amplifier cathode bias.
R-5	RESISTOR, fixed: comp; JAN RC30BF683K; spec JAN-R-11.	First amplifier screen dropping.
R-6, R-7	RESISTOR, fixed: comp; JAN RC30BF223K; spec JAN-R-11.	R-6: First amplifier plate loading. R-7: Second amplifier grid leak.
R-8, R-14, R-15	RESISTOR, fixed: comp; JAN RC30BF102K; spec JAN-R-11.	R-8: Second amplifier screen filter. R-14: Oscillator plate and screen filter. R-15: First amplifier plate filter.
R-9, R-10, R-11, R-48	RESISTOR, fixed: comp; JAN RC40BF103K; spec JAN-R-11.	Third amplifier grid leak.
R-12, R-49, R-50, R-51	RESISTOR, fixed: comp; JAN RC40BF682K; spec JAN-R-11.	Third amplifier screen dropping.
R-13	RESISTOR, fixed: comp; JAN RC30BF821K; spec JAN-R-11.	Oscillator plate load.
R-16	RESISTOR, fixed: WW; JAN RW22G103; spec JAN-R-26A.	+525-volt supply divider.

R-17	RESISTOR, variable: comp; 100,000 ohms $\pm$ 10%; 2 w; 3 solder lugs; metal case 1-1/16" diam x 9/16" d; enclosed; metal shaft 1/4" diam x 7/8" lg; linear; ins arm; w/out off position; normal torque; 3/8" lg #3/8-32 bushing; nonturn lug on 17/32" rad at 9 o'clock; AB #J1-SD3056-U1041; Wilcolec part #54134.	Second amplifier screen control EXCITATION ADJUST.
R-18 R-35	RESISTOR, fixed: WW; JAN RW22G802; spec JAN-R-26A.	R-18: +525-volt supply divider. R-35: +450-volt supply divider.
R-19	RESISTOR, fixed: comp; JAN RC40BB121K; spec JAN-R-11.	Second amplifier plate filter.
R-20 R-39	RESISTOR, fixed: WW; JAN RB12BR4020F; spec JAN-R-93.	R-20: Second amplifier plate meter shunt. R-39: Final amplifier grid meter shunt.
R-21	RESISTOR, fixed: comp; JAN RC30BF470K; spec JAN-R-11.	External excitation line terminating.
R-22	RESISTOR, fixed: WW; JAN RB12B25ROOF; spec JAN-R-93.	Second amplifier grid meter shunt.
R-23	RESISTOR, fixed: WW; JAN RW20G801; spec JAN-R-26A.	-450-volt supply divider.
R-24	RESISTOR, variable: comp; 0.10 meg $\pm$ 20%; 2.25 w @ +70°C, ambient; 3 solder lugs; metal case 1-1/16" diam x 9/16" thk, enclosed; slotted metal shaft 1/2" lg x 1/4" diam; mod log taper, 10% of total resist at 50% rotation, 30% at 65% rotation; mtg bushing 3/8" lg x #3/8-32 thd; locating lug on 17/32" radius at 9 o'clock; Wilcolec part #54125.	tone KEYING GAIN CONTROL.
R-25	RESISTOR, fixed: comp; JAN RC30BF393K; spec JAN-R-11.	Keying tube grid (#1) filter.
R-26	RESISTOR, fixed: comp; JAN RC30BF103K; spec JAN-R-11.	Keying tube plate (#5) current limiting.
R-30	RESISTOR, variable: comp; 250 ohms $\pm$ 10%; 2.5 w @ +70°C, ambient; 3 solder lugs; metal case 1-1/16" diam x 9/16" thk, enclosed; slotted metal shaft 1/2" lg x 1/4" diam; linear taper; mtg bushing 3/8" lg x #3/8-32 thd; locating lug on 17/32" rad at 9 o'clock; Wilcolec part #54126.	KEYING BIAS ADJUST.
R-31	RESISTOR, fixed: WW; JAN RW20G122; spec JAN-R-26A.	-450-volt supply divider.

1. Identification Table of Parts for Radio Transmitter Model 96D

Symbol	Name of part and description	Function of part
R-32	RESISTOR, fixed: WW; JAN RB12B4R170F; spec JAN-R-93.	Third amplifier grid meter shunt.
R-33	RESISTOR, fixed: comp; JAN RW30BF473K; spec JAN-R-11.	Channel control grid biasing.
R-34	RESISTOR, fixed: comp; JAN RC30BF394K; spec JAN-R-11.	Channel control grid biasing.
R-36	RESISTOR, fixed: comp; JAN RC30BF183K; spec JAN-R-11.	Channel control grid return.
R-37	RESISTOR, fixed: comp; JAN RC30BF471K; spec JAN-R-11.	Channel control cathode bias.
R-40	RESISTOR, fixed: WW; JAN RB12BR2000F; spec JAN-R-93.	Third amplifier total meter shunt.
R-41	RESISTOR, fixed: WW; JAN RW38G502; spec JAN-R-26A.	Final amplifier grid leak.
R-42, R-43	RESISTOR, variable: WW; JAN RP151SA250KK; spec JAN-R-22.	R-42: Overload adjust. R-43: Underload adjust.
R-44 R-45, R-46	RESISTOR, fixed: comp; JAN RC40BF822K; spec JAN-R-11.	Channel control plate dropping.
R-47	RESISTOR, fixed: WW; JANRW21G402; spec JAN-R-26A.	Bias protection relay O-4 shunt.
R-52, R-53	RESISTOR, fixed: WW; JAN RC30BF472K; spec JAN-R-11.	Antenna drain.
X-1, X-2, X-5, X-6	SOCKET, tube: octal; one piece saddle mtg; two 5/32" hole on 1-1/2" mtg/c; 1-1/8" diam chassis cut-out required; 1-7/32" diam x 1/2" thk body; mica-filled bakelite; silver pl beryllium-copper cont; unmarked; Cinch #51B13405; Wilcolec part #29797.	
X-3	SOCKET, tube: 5 cont medium; retainer ring mtg; two 3/16" x 7/32" mtg slots on 1-11/16" ctrs; round ceramic body 1-1/4" diam x 5/8" h; phosphor-bronze silver pl cont; Army spec 71-3074; Amphenol #49RSS5M, Wilcolec part #29813.	
X-4	SOCKET, tube: 7 cont Jumbo; underchassis base mtg; four	

X-7	0.174" diam mtg holes on 1-7/8" x 1-7/8" ctrs; 2-5/8" sq x 9/32" thk steatite body; beryllium-copper silver pl cont; Army spec 71-3074; Johnson EF #122-237-4; Wilcolec part #29815.	
X-8, X-9	SOCKET, tube: 4 cont medium; retainer ring mtg; two 3/16" x 7/32" mtg slots on 1-11/16" ctr; round ceramic body 1-1/4 diam x 5/8" h; phosphor-bronze silver pl cont; Army spec 71-3074; Amphanol #49RSS4M; Wilcolec part #29814.	
X-10	SOCKET, tube: 4 cont; above-chassis base mtg; two 7/32" diam mtg holes on 2-13/16" ctrs; round ceramic body 3-3/8" diam x 23/32" d w/twistlock shell; silver pl beryllium-copper cont; per Army spec 71-3074; Johnson EF #123-211-18; Wilcolec part #29840.	
	SOCKET, crystal: 3 cont; below-chassis base mtg; two 11/64" diam holes on 1-27/32" mtg/c; molded ceramic body 2-11/32" lg x 1-3/8" wd x 9/32" thk; phosphor-bronze silver pl cont; per Army spec 71-3074; Mykroy #ETS-3; Wilcolec part #29816.	
S-1	SWITCH, rotary: 3 pole, 2 position; silver pl brass cont; ceramic body; 1-3/4" diam x 2-3/16" d overall; solder lug term; nonshorting; single hole mtg #3/8-32 x 3/8" lg bushing; shaft 1/4" diam x 1-1/8" proj, slotted; ceramic parts grade L3 per JAN-I-10; tropicalized; p/o Radio Transmitter Model 96D; Oak #38805-H1C; Wilcolec part #10237.	EXCITATION SWITCH.
S-2, S-3	SWITCH, rotary: 1 pole, 4 position; silver pl brass cont; ceramic body; 1-3/4" diam x 4-1/4" d overall; solder lug term; shorting; single hole mtg; #3/8-32 x 3/8" lg bushing; shaft 1/4" diam x 2-3/4" proj, slotted; ceramic parts grade L3 per JAN-I-10; tropicalized; p/o Radio Transmitter Model 96D; Oak #38804-H1C; Wilcolec part #10236.	S-2: 1ST AMP PLATE BAND SWITCH. S-3: 2ND AMP PLATE BAND SWITCH.
S-4	SWITCH, rotary: 2 pole, 6 position, 2 sect; silver pl brass cont; ceramic body; 1-3/4" diam x 2-3/16" d overall; solder lug term; nonshorting; single hole mtg #3/8-32 x 3/8" lg bushing; shaft 1/4" diam x 2-3/4"; 60 deg indexing; no stop; ceramic parts grade L3 per JAN-I-10; tropicalized; p/o Radio Transmitter Model 96D; Oak #38790-H2C; Wilcolec part #10238.	Multiscale METER SWITCH.
S-5	SWITCH, toggle: SPDT, ON-OFF; momentary cont; JAN ST42H; Spec JAN-S-23.	TEST KEY

1. Identification Table of Parts for Radio Transmitter Model 96D

Symbol	Name of part and description	Function of part
S-6	SWITCH, toggle: SPST; JAN ST42A; spec JAN-S-23.	CHANNEL CONTROL.
S-7	SWITCH, toggle: DPST; JAN ST52K; spec JAN-S-23.	220-volt a-c line.
S-8	SWITCH, push: door interlock; 10 amp 220 v; 2 piece;	Interlocks. S-10 and S-11 are parts of the high voltage switch assembly S-12.
S-9	male part; spring-loaded disc cont, bakelite case, 1-7/8" lg x 11/16" wd x 1-3/8" d; receptacle part; two cont,	
S-10	bakelite case, 2-5/16" lg x 11/16" wd x 15/16" d; two #8-32 set screws for bare wire term; GE #7460330G4; Wilcolec part #10026.	
S-11		
S-12	SWITCH, push-pull: 4 pole, two position; 4000 v DC; metal case 1-7/16" lg x 9-1/4" wd x 3-1/8" d; sliding blade term; four 3/16" diam holes on 14-7/8" x 4-3/8" mtg/c; p/o Radio Transmitter Model 96D; Wilcolec part #96881.	High-voltage switch.
S-13	SWITCH, snap: used as interlock in high-voltage switch assembly; SPST normally open; 10 amp 125 v; spring leaf actuated; bakelite case 1-7/8" x 7/8" x 11/16"; two solder lug term; p/o High voltage switch Wilcolec #96881; Micro Switch Corp. No. YZ-RL8; Wilcolec part #10027.	Interlocks. Parts of the high voltage switch assembly S-12.
S-14		
S-15		
S-16		
T-1	TRANSFORMER, AF: input type; grade I class A per JAN-T-27; pri, 500 ohms CT at 10 ma DC; 20 ohms DC resistance; sec'd; 40,000 ohms; 1500 ohms DC resistance; HS metal case; 1-29/32" lg x 1-25/32" wd x 2-7/16" h; freq response; 500-2000 ups $\pm$ 2 db; 5 solder term on bottom; two 3/16" diam holes on 2-1/8" mtg/c; -55° to +85°C ambient temp up 10,000 ft operating altitude; nonoperating up to 35,000 ft; p/o Radio Transmitter Model 96D; Chi Trans #13361; Wilcolec part #840005.	Tone keying input coupling.
T-2	TRANSFORMER, power: fil type; grade I class A per JAN-T-27; input 210/220/230/240 v, 60 cps, single ph; sec'd, 10 v CT at 5.0 amp (+0.20 amp DC); HS metal case; 3-15/64" lg x 2-31/32" wd x 4-15/64" h; eight solder term on bottom; two rows 3-1/2" apart of three 7/32" diam mtg holes at 1-1/8" intervals; -55° to +85°C ambient temp up to 10,000 ft operating altitude; nonoperating up to 35,000 ft; p/o Radio Transmitter Model 96D; Chi Trans part #13362; Wilcolec part #842010.	Third amplifier filament supply.
T-3	TRANSFORMER, power: fil type; grade I class A per JAN-T-27; input 210/220/230/240 v, 60 cps, single ph; sec'd #1, 6.3 v CT at 2.50 amp; sec'd #2, 6.3 v CT at	Exciter filament supply.

T-4	1.0 amp; sec'd #3, 6.3 v CT at 4.0 amp (+0.150 amp DC); HS metal case; 3-15/64" lg x 2-31/32" wd x 4-15/64" h; 14 solder term on bottom; two rows 3-1/2" apart of three 7/32" diam mtg holes at 1-1/8" intervals; -55° to +85°C ambient temp up to 10,000 ft operating altitude; nonoperating up to 35,000 ft; p/o Radio Transmitter Model 96D; Chi Trans #13363; Wilcolec part #842011.	Final amplifier filament supply.
V-1	TRANSFORMER, power: fil type; grade I class A per JAN-T-27; input 210/220/230/240 v, 60 cps, single ph; sec'd; 7.5 v CT at 24.0 amp (+1.0 amp DC); HS metal case; 5-5/16" lg x 4-25/32" wd x 6-1/16" h; eight solder term recessed into bottom; 2 rows 5-3/8" apart of three 15/64" diam mtg holes at 1-5/8" intervals; -55° to +85°C ambient temp up to 10,000 ft operating altitude; nonoperating up to 35,000 ft; p/o Radio Transmitter Model 96D; Chi Trans #13364; Wilcolec part #842012.	V-1: Oscillator. V-2: First amplifier.
V-2	TUBE, electron: JAN-6AC7.	Second amplifier.
V-3	TUBE, electron: JAN-807.	Third amplifier.
V-4	TUBE, electron: JAN-813.	Tone keying.
V-5	TUBE, electron: JAN-6SN7.	Channel control.
V-6	TUBE, electron: JAN-6J5.	Bias isolator.
V-7	TUBE, electron, JAN-811.	Final amplifier.
V-8	TUBE, electron: JAN-450TL.	
V-9		

2. Identification Table of Parts for Rectifier Power Unit Model 36D

Symbol	Name of part and description	Function of part
	RECTIFIER POWER UNIT: Wilcox Model 36D; rectifier type; output 4000 v DC at 3 amp, 2000 v DC at 0.5 amp, +500 v DC at 0.45 amp, -500 v DC at 0.225 amp, 12 v DC at 4 amp; input 15 kva, 220 v 3 ph 60 cyc; 72" h x 24-1/2" d 29-1/2" wd overall; fullwave; filtered output; JAN components; used with Radio Transmitter Model 96D.	

2. Identification Table of Parts for Rectifier Power Unit Model 36D

Symbol	Name of part and description	Function of part
C-1 C-2	CAPACITOR, fixed; electrolytic; JAN type CE41C122F; spec JAN-C-62. (1 sect; 1200 mf; 25 vdcw; working temp range -55°C to +85°C; cyl case 1-3/8" diam x 4-5/16" h; HS metal can; 2 solder lug term on bottom; terminals from can; thd #7/8-16" one end; includes 3/16" thk hex steel nut; Dubilier #CE41C122F; Wilcolec part #825002.	12-volt supply filter.
C-3 C-4, C-5, C-6	CAPACITOR, fixed: paper; JAN type CP70E1FG405K; spec JAN-C-25.	C-3 and C-4: Bias rectifier supply filter. C-5 and C-6: Low voltage rectifier filter.
C-7	CAPACITOR, fixed: paper; JAN type CP70D1FP205K; spec JAN-C-25.	4, 200-volt supply filter.
C-8	CAPACITOR, fixed: paper; JAN type CP70E1FL205K; spec JAN-C-25.	2, 100-volt supply filter.
K-1	CIRCUIT BREAKER, magnetic; 3 pole; 230 v AC, 50 amp, 3 ph; molded phenolic case; 5-1/4" lg x 3" wd x 3-5/8" d; time delay 0.7 to 1.8 sec at 500% local; six #10-32 x 1-1/8" lg stud term at back; manual reset; panel mtg; four 13/64" mtg holes on 63/64" x 4-23/64" ctr; continuous duty at -55° to +85°C ambient temp; moisture and fungus treated; sealed; Heineman #3363SM6-50; Wilcolec part #14079.	220-volt power supply protection.
	CLEANER ELEMENT, air; crimped screen wire; reusable; 19-1/2" lg x 9-9/16" wd x 2" thk; with cleaning instructions and handle on ends; for Rectifier Power Unit Model 36D; Farr Co. type 44-RMZ; Wilcolec part #63007.	Air filter.
	CLIP: fuse; beryllium copper, silver pl; 3/4" h x 5/8" lg x 15/32" wd; for 13/32" diam fuses; 0.196" diam mtg hole; Littelfuse, Inc. #125004; Wilcolec part #27538.	Holder for fuse F-14.
J-1	CONNECTOR, receptacle: Army-Navy receptacle #AN3102-22-19P; 14 round cont rated 20 amp; 1-11/32" lg x 1-1/2" sq; cylindrical aluminum body, black anodic; molded phenolic insert; four mtg holes 0.120" diam on 1-1/4" ctr; Wilcolec part #29812.	For making connections to low-voltage rectifier assembly.
J-2	CONNECTOR, receptacle: Army-Navy receptacle	For connecting 220-volt ac to filament

J-3	#AN3102-16S-4P; 2 round cont rated 20 amp; 29/32" lg x 1-9/32" sq; cylindrical aluminum body, black anodic; molded phenolic insert; four mtg holes 0.120" diam on 31/32" x 31/32" ctr; Wilcolec part #28598.	transformers of high-voltage rectifier assembly.
J-4	CONNECTOR, receptacle: Army-Navy receptacle #AN3102-22-14P; 19 round cont rated 20 amp; 1-11/32" g x 1-1/2" sq; cylindrical aluminum body, sandblasted; molded phenolic insert; four mtg holes 0.120" diam on 1-1/4" x 1-1/4" ctr; Wilcolec part #29841.	For making connection to high-voltage switching unit.
J-5	CONNECTOR, receptacle: 22 round female cont; Army-Navy #AN3102-36-1S; 4 cont rated 35 amp, 18 rated 20 amp; 1-7/16" lg x 2-1/2" sq; cylindrical aluminum body; black anodic; molded phenolic insert; Wilcolec part #29846. (Optional Item).	For making connection from the wall terminal box to the rectifier cabinet.
P-1	CONNECTOR, plug: Army-Navy plug #AN3106-22-19S; 14 round cont rated 20 amp; 2-3/16" lg x 1-9/32" diam; cylindrical aluminum body, black anodic; molded phenolic insert; Wilcolec part #28680.	For making connection from the switch box to the rectifier cabinet.
P-2	CONNECTOR, plug: Army-Navy plug #AN3106-16S-4S; 2 round cont rated 20 amp; 1-7/16" lg x 1-1/4" diam; cylindrical aluminum body, black anodic; molded phenolic insert; Wilcolec part #28679.	Used with J-1.
P-3	CONNECTOR, plug: Army-Navy plug #AN3106-22-14S; 19 round cont rated 20 amp; 2-3/16" lg x 1-9/32" diam; cylindrical aluminum body, black anodic; molded phenolic insert; Wilcolec part #28692.	Used with J-2.
F-1 F-8	FUSE, cartridge: 1 amp, carry 110% load; open at 135% in 1 hr; 250 v; 1 time; laminated body; ferrule term 3/8" lg x 13/32" diam nonindicating; 13/32" diam x 1-1/2" lg; UL approved Buss #BAF-1; Wilcolec part #14088.	Used with J-3.
F-2 F-5, F-6, F-7, F-9, F-11	FUSE, cartridge: 2 amp, carry 110% load; open at 135% in 1 hr; open at 200% in 25 sec; 250 v; 1 time; fibre body; ferrule term 3/8" lg x 13/32" diam, nonindicating; 13/32" diam x 1-1/2" lg; long time lag; UL approved; Buss #FNM-2; Wilcolec part #14086.	Protection of T-3.
		F-2 and F-9: Protection of T-2. F-5 and F-7: Projection of high-voltage rectifier assembly transformers. F-6 and F-11: Protection of T-1.

2. Identification Table of Parts for Rectifier Power Unit Model 36D

Symbol	Name of part and description	Function of part
F-3 F-10, F-12, F-13	FUSE, cartridge: 2-1/2 amp, carry 110% load; open at 135% in 1 hr; open at 200% in 25 sec; 250 v; 1 time fibre body; ferrule term 3/8" lg x 13/32" diam; nonindicating; 13/32" diam x 1-1/2" lg; long time lag; UL approved; Buss #FNM-2-1/2; Wilcolec part #14085.	F-3 and F-10: Protection of T-4. F-12 and F-13: Protection of blower motor.
F-4	FUSE, cartridge: 5 amp, carry 110% open at 135% in 1 hr, 250 v; 1 time; laminated body; ferrule term 3/8" lg x 13/32" diam; nonindicating; 13/32" diam x 1-1/2" lg; UL approved; Buss #BAF-5; Wilcolec part #14087.	Protection of 12-volt d-c supply.
F-14	FUSE, cartridge: 1 amp; 2500 v; carry 110%, opens at 135% in 1 hr; opens in 30 sec at 200%; 1 time; fibre body; ferrule term 13/32" diam x 3/8" lg; nonindicating; 13/32" diam x 4-1/2" lg; Buss #HVB-1; Wilcolec part #14062.	Protection of T-5.
	HOLDER, fuse: panel mtg post type; for 13/32" diam x 1-1/2" lg cartridge fuses; molded phenolic; 15 amp, 250 v; 2-7/16" lg x 1-3/4" wd x 1-1/8" thk; mts in 7/8" diam hole with one 11/64" diam hole each side on 1-5/16" mtg/c; two solder term; screw cap; Buss #HPC; Wilcolec part #27537.	For fuses F-1 through F-13.
	INSULATOR, stand-off: round post shape; JAN NS4W-0308; spec JAN-I-8.	
	INSULATOR, stand-off: square post shape; JAN NS4W-1412; spec JAN-I-8.	
	INSULATOR, stand-off: round post shape; JAN NS4W-0332; spec JAN-I-8.	
	INSULATOR, stand-off: round post shape; JAN NS3W-0106; spec JAN-I-8.	
	INSULATOR, stand-off: round post shape; JAN NS4W-0316; spec JAN-I-8.	
	KNOB: round; black anodic aluminum; for 1/4" diam shaft; two #6-32 set screws; 1/8" diam stainless steel indicating pin near edge; 3/8" d shaft hole, straight knurled; p/o Rectifier Power Unit Model 36D; Wilcolec part #60236.	Used on S-1.

M-1	METER, voltmeter: AC; rectifier; JAN MR36W300ARVV; 1.00 ma current at full scale; -55° to +85°C ambient temp; Marion Elec Instr model HM3; spec JAN-I-6.	A-C LINE Meter.
M-2 M-3	METER, voltmeter: DC; JAN MR36W800DCVV; -55° to +85°C ambient temp; Marion Elec Instr model HM3; spec JAN-I-6.	M-2: R-F BIAS supply meter. M-3: LOW R-F PLATE supply meter.
M-4	METER, voltmeter: DC; JAN MR36W005DCKV; -55° to +85°C ambient temp; Marion Elec Instr model HM3; spec JAN-I-6.	FINAL PLATE supply meter.
B-1	MOTOR, AC; single-phase type; 1/6 HP, 1725 rpm; open frame, dripproof; cont duty at -55°C ambient temp up to 10,000 ft altitude; 5/8" diam shaft x 2" lg one end; 8-5/8" lg excluding shaft x 7-3/4" wd x 6-11/16" h; 230 v 60 cps; resilient mtg base; 4 mtg holes on 3" x 4-7/8" ctr; ball bearing; fungus treated per JAN-T-152; Leland Elec #SD739/84014-2; Wilcolec part #45626.	Operate BLOWER.
L-1	REACTOR: swinging choke; 5.0 to 15 hy, 250 to 50 ma DC; 100 ohms DC resistance; 2500 v peak test; HS metal case; 4-1/8" lg x 4-9/16" wd x 5-5/16" h; 2 rows 4-3/4" apart of three 15/64" diam mtg holes at 1-1/4" intervals; -55° to +85°C ambient temp up to 10,000 ft altitude; grade I class A per JAN-T-27; Chi Trans #13374; Wilcolec part #838005.	Filter choke for -450-volt supply.
L-2	REACTOR: filter choke; 8.0 hy at 250 ma DC, 100 ohms DC resistance; 2500 v peak test; HS metal case; 4-1/8" lg x 4-9/16" wd x 5-5/16" h; 2 rows 4-3/4" apart of three 15/64" diam mtg holes at 1-1/4" intervals in flanges; -55° to +85°C ambient temp up to 10,000 ft altitude; grade I class A per JAN-T-27; Chi Trans #13375; Wilcolec part #838006.	Filter choke for -450-volt supply.
L-3 L-6	REACTOR, filter choke; 8.0 hy at 500 ma DC; 50 ohms DC resistance; 4500 v peak test; HS metal case; 5-17/64" lg x 6-1/8" wd x 7-1/16" h; 2 rows 6" apart of three 17/64" diam mtg holes at 2-1/8" intervals; -55° to +85°C ambient temp up to 10,000 ft altitude; grade I class A per JAN-T-27; Chi Trans #13373; Wilcolec part #838004.	L-3: Filter choke for 525-volt supply. L-6: Filter choke for 2,100-volt supply.
L-4	REACTOR: swinging choke; 5.0 to 15 hy, 500-100 DC; 50 ohms DC resistance; 2500 v peak test; HS metal case; 6-1/8" lg x 5-17/64" wd x 7-1/16" h; 2 rows 6" apart of 17/64" diam mtg holes 2-1/8" intervals; -55° to +85°C ambient temp up to 10,000 ft altitude; grade I class A per JAN-T-27; Chi Trans #13372; Wilcolec part #838003.	Filter choke for 525-volt supply.

2. Identification Table of Parts for Rectifier Power Unit Model 36D

Symbol	Name of part and description	Function of part
L-5	REACTOR: filter choke; 0.5 hy at 3.0 amp DC; 50 ohms DC resistance; 7500 v peak test; HS metal case; 7-3/64" lg x 6-1/8" wd x 8-5/64" h; 2 rows 7" apart of 17/64" diam mtg holes at 2-1/2" intervals; -55° to +85°C ambient temp up to 10,000 ft altitude; grade I class A per JAN-T-27; Chi Trans #13377; Wilcolec part #838007.	Filter choke for 4, 200-volt supply.
L-7 L-8	COIL, RF: filter choke; 4 pie universal wound; unshielded; 2.5 uh, 2.5 amp; 1/2" diam x 2-3/4" lg; ceramic form; 3/8" diam x 3/4" lg steatite ins on one end, tapped 6-32 axially for mtg; two solder term; moisture and fungus proofed; p/o Rectifier Power Unit Model 36D; Wilcolec part #38602.	Prevent r-f currents in line voltage meter.
CR-1	RECTIFIER, metallic: magnesium-copper-sulphide; input 18 v AC 60 cps; output 12.6 DC 4 amp; rectangular; 4-1/4" lg x 2-5/8" wd x 3" d; single 5/16"-24 stud mtg; ins bolt mtg; p/o Rectifier Power Unit Model 36D; Mallory #1B20C7; Wilcolec part #46009.	12-volt d-c supply.
O-1	RELAY, armature: DPDT; cont rating 10 amp non-inductive; 3/16" diam silver cont; double coil, 70 ohms, 12 v; 7.5 vdc oper, release at 75% of oper voltage; solder lug term on coil and cont; 1-5/8" wd x 1-25/32" lg x 1-15/16" h; four #6-32 mtg holes on 1-5/16" x 1/2" ctr; -55° to +85°C ambient temp; moisture and fungus treated per JAN-T-152; Phillips Control #A27QA22H2; Wilcolec part #11736.	Controlled by interlock circuit, contactor for primary of 525-volt supply and 4, 200-volt supply contactor.
O-2	RELAY, armature: 4PST; norm open; cont silver-palladium 250 v; single coil 205-245 v 50/60 cps; 450 ohms DC; screw term; 3-5/8" h x 2-3/4" wd x 3-3/8" d; three 3/16" mtg holes on 2-1/4" x 3-1/4" ctr; fast acting; continuous duty at -55° to +85°C ambient temp up to 10,000 ft altitude; moisture and fungus treated; RBM (Essex Wire) #101140; Wilcolec part #11737, includes --	Controls power to transformers T-2, T-3, T-4, T-6, T-7, T-8, and T-9, BLOWER B-1, time delay relay K-2 and H. V. PRIMARY CONTACTOR K-3.
	COIL, relay: p/o relay RBM (Essex Wire) #101140; 205-245v, 50/60 cps; 450 ohms DC; 2 screw term; 1-5/16" x 1-5/8" x 1" overall; hollow rectangular shaped; ins; marked "RBM coil 45225-2"; Wilcolec part #11769, and	

CONTACT ASSEMBLY, relay: fixed; p/o relay RBM (Essex Wire) #101140; 4 sets cont on molded plastic support with screw clamp term; 2-3/8" x 2-3/4" x 1-3/4" d; eight silver-palladium 3/16" diam cont; RBM #45200-1; Wilcolec part #11767, and

CONTACT ASSEMBLY, relay: movable; p/o relay RBM #101140; four sets spring-loaded cont on molded plastic carrier; 2-5/16" x 7/8" x 1-11/16" d; eight 3/16" diam silver-palladium cont; RBM #45211-1; Wilcolec part #11768.

RELAY, armature: 1C1A; #18 ga platinum iridium cont rated 3 amp, 150 w; single wound 12 v DC operating; 200 ohms DC; solder terms on coil and cont; 4-1/16" lg x 1-11/16" wd x 1-3/16" h; two #8-32 mtg holes at 3/4" ctr; fast acting; -55° to +85°C ambient temp up to 10,000 ft altitude; moisture and fungus treated; Phillips Control #2QA316A1; Wilcolec part #11738, includes --

COIL, relay: p/o Phillips Control #2QA316A1 relay; 12 v DC; 200 ohms DC resistance; 8400 turns #31 EC wire; 1" diam x 3" lg overall; single axial tapped mtg hole #8-32 x 1/4" d thd; 2 solder term; fibre glass wrap w/ fungusproof varnish over; Phillips Control #2CA1Q Special; Wilcolec part #11770.

RELAY, armature: SPDT; tungsten cont, 1/8" diam; rated 5 kv DC at 1.5 amp; coil, single winding, 8.1 v operate, 6.4 release, 30 ohms DC resistance, ins; wire lead term on coil, pin term on cont; 4-1/8" lg x 4-13/16" wd x 2-1/2" d; coil clamps to chassis with bakelite plate and four spacers (not included); switch mounted with clip term on cont pins; fast acting; p/o Rectifier Power Unit Model 36D; Wilcolec part #11740, includes --

SWITCH, vacuum: SPDT; rated 5 kv DC at 1.5 amp; T-shaped glass body 4-1/8" wd x 4-13/16" lg x 7/8" thk; 3 pin term 0.105" diam x 3/8" lg; supported by term; actuated by separate external coil; p/o Rectifier Power Unit Model 36D; Eimac #VS-2; Wilcolec part #10246, and

COIL, relay: actuating; for Rectifier Power Unit Model 36D; 2500 turns #25 E wire; 30 ohms DC; 1-3/4" lg x 5/8" ID x 2-1/4" OD; two 9" leads from bottom per JAN-C-76; continuous oper at -55° to +85°C ambient temp up to 10,000 ft altitude; bobbin material type

Control operation of relays O-8, O-9, O-10, O-11, and O-12.

Switch 4,200-volt terminal of each transmitter to either the unfiltered 4,200-volt supply or the modulator output.

O-3
thru
O-7

O-8
thru
O-12

2. Identification Table of Parts for Rectifier Power Unit Model 36 D

Symbol	Name of part and description	Function of part
K-2	LTS-E-4 per JAN-P-79; moisture and fungus treated per JAN-T-152; Acme Wire Co. C-15651; Wilcolec part #11739. RELAY, time-delay: SPST, norm open; microswitch cont rated 5 amp at 250 v AC; single coil 220-245 v AC; 60 cps 670 ohms DC; 2 solder lug terminals; 2-25/32" h x 3-3/8" wd x 2-25/32" d; two 3/16" diam holes on 2-7/8" mtg/c; 0-57 sec time delay; automatic reset; moisture-proofed and fungusproofed per JAN-T-152; 10,000 ft operating altitude; -55° to +85°C ambient temp; Haydon #5901-2; Wilcolec part #37007, includes -- COIL, relay: p/o Haydon #5901-2 time-delay relay; 3.5 w, 220-245 v AC, 60 cps, 670 ohms DC; Haydon #1313-3, and SWITCH, sensitive: p/o Haydon #5901-2 time-delay relay; SPDT; 5 amp 250 v AC; molded plastic case; Micro Sw #BZR-W-10.	Prevents operation of 525-volt, 2, 100-volt, and 4, 200-volt supplies until rectifier tubes are heated sufficiently.
K-3	RELAY, solenoid: 3PST norm open; silver cont rated 40 amp 230 v AC; single multilayer coil 205-245 v AC, 60 cps, single ph, 54 ohms DC, ins; screw term on coil and cont; 4-1/2" lg x 5" wd x 4" d overall; three 3/16" wd slots on 2-1/2" x 4-5/8" mtg/c; fast acting; ambient temp -55° to +85°C up to 10,000 ft operating altitude; moistureproofed and fungusproofed per JAN-T-152; AH&H #39606; Wilcolec part #11741, includes -- COIL, relay: for AH&H #39606 relay, multilayer wound; 205-245 v AC, 60 cps, single ph; hollow rectangular shape; 1-7/8" lg x 1-3/4" wd x 1-3/8" d overall; two 6" wire leads; moistureproofed and fungusproofed per JAN-T-152; no markings; AH&H #37640-802; Wilcolec part #11772, and CONTACT, relay: fixed; 1/2" x 5/8" silver cont 3/32" thk; rated 40 amp at 230 v AC; straight, 1-5/8" lg x 5/8" wd x 1/4" thk overall; 7/32" hole 11/32" from one end; cont 13/16" from mtg hole; for AH&H relay #39606; AH&H #37640-301; Wilcolec part #11771.	Applied 220 volts, 3 phase power to primary of 2, 100-and 4, 200-volt supply power transformer.
R-1 R-2	RESISTOR, fixed: WW; JAN RB14B80002F; spec JAN-R-93; Shallcross type BX116J; Wilcolec part #863001.	R-1: Meter multiplier for M-2. R-2: Meter multiplier for M-3.

R-3 R-4 R-8	RESISTOR, fixed: WW; JAN RW45J803; spec JAN-R-26A; IRC; Wilcolec part #858006.	R-3 and R-4: 4, 200-volt supply bleeder. R-8: 2, 100-volt supply bleeder.
R-5	RESISTOR, fixed: WW; JAN type MFA505; spec JAN-R-29; IRC; Wilcolec part #869512.	Meter multiplier for M-4.
R-6 R-7	RESISTOR, fixed: WW; JAN RW43J353; spec JAN-R-26A; IRC; Wilcolec part #858005.	R-6: -450-volt supply bleeder. R-7: 525-volt supply bleeder.
X-1	SOCKET, tube: octal; one piece saddle mtg; two 5/32" holes on 1-1/2" mtg/c; 1-1/8" diam chassis cut-out required; 1-7/32" diam x 1/2" thk body; mica; silver pl beryllium copper cont; unmarked; Cinch #51B13405; Wilcolec part #29797.	V-1 tube socket.
X-2 X-3	SOCKET, tube: 4 cont; above-chassis base mtg; four 13/64" diam mtg holes on 2-5/16" diam circle; round steatite body 2-13/16" diam x 11-1/16" d w/twistlock shell; glyptol over screw heads; silicone treated; beryllium-copper, silver pl, hot tin-dipped cont; per U.S. Army spec 71-3072; Johnson EF #123-209-15; Wilcolec part #29803.	V-2 and V-3 tube socket.
X-4 thru X-9	SOCKET, tube: 4 cont; below-chassis base mtg; four 7/32" mtg holes on 2-13/16" diam circle; round steatite body 3-3/8" diam x 23/32" d w/twistlock shell; glyptol over screw heads; silicone treated; beryllium-copper, silver pl, hot tin-dipped cont; per spec 71-3072; Wilcolec part #29804.	V-4 through V-9 tube sockets.
S-1	SWITCH, rotary: 2 pole, 3 pos, 1 sect; silver pl brass cont; ceramic body; 1-3/4" diam x 1-7/8" d overall; solder lug term; nonshorting; 3/8-32 x 3/8" lg bushing; shaft 1/4" diam x 5/8" proj, flattened; 60 deg indexing; impregnated per JAN-I-10; finished for tropical use; p/o Rectifier Power Unit Model 36D; Oak #38791-H1C; Wilcolec part #10239.	LINE VOLTAGE switch for connecting each of the three phases to the line voltmeter.
S-2 thru S-4	SWITCH, push: door interlock; 10 amp, 220 v; 2 piece; male part, single spring-loaded disk cont, silver pl brass, molded bakelite case, no term, 1-7/8" lg x 11/16" wd x 1-3/8" d, two 5/32" diam holes on 1-1/4" mtg/c; receptacle part, two silver pl brass cont blocks, molded bakelite case, 2-5/16" lg x 11/16" wd x 15/16" d, cont normally open, two #8-32 set screws for bare wire term, two 5/32" diam holes on 1-13/16" mtg/c;	Door interlocks.

2. Identification Table of Parts for Rectifier Power Unit Model 36D

Symbol	Name of part and description	Function of part
S-5 S-6	GE #7460330G4; Wilcolec part #10026. SWITCH, toggle: SPST; JAN ST42A; spec JAN-S-23.	S-5: HIGH-VOLTAGE switch controls K-3. S-6: LOW-VOLTAGE switch controls O-1.
S-7	SWITCH, push: start-stop; 3 amp 110 v or 2 amp 220 v AC; 1 amp 115 v or 0.5 amp 230 v DC; molded phenolic body; 3-1/2" lg x 1-1/4" wd x 2-3/8" d; momentary cont 1 norm open, 1 norm closed; four #8-32 screw term; two 11/64" holes on 3-19/64" mtg/c; AB #2SA; Wilcolec part #10016.	START-STOP switch controls O-2.
T-1	TRANSFORMER, power: fil; grade I class A per JAN-T-27; input 210/220/230/240 v, 60 cps, single ph; sec'd 14/16/18 v at 6.7 amp; 2500 v peak test; HS metal case; 4-1/8" lg x 4-9/16" wd x 5-5/16" h; two rows 4-3/4" apart of three 15/64" diam mtg holes at 1-1/4" intervals; 9 solder term on bottom -55° to +85°C ambient temp up to 10,000 ft operating altitude; nonoperating up to 35,000 ft; Chi Trans #13366; Wilcolec part #842003.	Supplies power to 12-volt supply rectifier.
T-2	TRANSFORMER, power: plate; grade I class A per JAN-T-27; input 210/220/230/240 v 60 cps; single ph; sec'd 1100 v CT at 0.250 amp DC (choke input); 2500 v peak test; HS metal case; 5-5/16" lg x 4-25/32" wd x 6-1/16" h; 8 solder term on bottom; 2 rows 5-3/8" apart of three 15/64" mtg holes at 1-5/8" intervals; -55° to +85°C ambient temp up to 10,000 ft operating altitude; nonoperating up to 35,000 ft; Chi Trans #13370; Wilcolec part #842007.	Supplies plate power to -450-volt bias supply rectifier.
T-3	TRANSFORMER, power: fil; grade I class A per JAN-T-27; input 210/220/230/240 v, 60 cps, single ph; sec'd #1, 5.0 v CT at 3.0 amp (+0.25 amp DC); sec'd #2, 2.5 v CT at 10.0 amp (+0.5 amp DC); 2500 v peak test; HS metal case; 3-15/64" lg x 2-31/32" wd x 3-55/64" h; 11 solder term on bottom; 2 rows 3-1/2" apart of three 7/32" mtg holes at 1-1/8" intervals; -55° to +85°C ambient temp up to 10,000 ft operating altitude; nonoperating up to 35,000 ft; Chi Trans #13365; Wilcolec part #842002.	Supplies power to -450-volt supply and 525-volt supply rectifier tube filaments.
T-4	TRANSFORMER, power: plate; Grade I class B per	Supplies plate voltage for 1-v rectifier

tubes V-2 and V-3.

JAN-T-27; input 210/220/230/240 v, 60 cps, 1 ph; sec'd 1250 v CT at 0.5 amp DC (choke input); 2500 v peak test; hermetically sealed metal case; 6-1/8" lg x 5-17/64 w x 7-1/16 h 8 solder term on bottom; 2 rows 6" apart of three 17/64 mtg holes at 2-1/8" intervals; -55° to +85°C ambient temp up to 10,000 ft operating altitude; nonoperating up to 35,000 ft; Chi Trans #13369; Wilcolec part #842006.

TRANSFORMER, power: plate; Grade I class A per JAN-T-27; input 210/220/230/240 v, 60 cps, 3-ph Delta sec'd 3-ph Wye, 1720 v AC ea leg of Wye, 3 amp DC full-wave (+0.5 amp DC half-wave); delivers 4000 v DC full-wave and 2000 v DC half-wave from CT; 2500 v peak insulation test between winding #1 & core, 7000 v between winding #2 & core, and 7000 v between windings, #1 & #2; enclosed metal case; 28-3/4 lg x 21-1/4 w x 15-1/2 h; twenty-two 1/4-20 porcelain screw terminals 2-1/8" h; four 1-1/4" eyebolts on top for hoisting; -55° to +85°C ambient temp up to 10,000 ft operating altitude, nonoperating up to 35,000 ft; Chi Trans #13371; Wilcolec part #842008. (This transformer used with Rectifier system shown in Fig. 94. See next item for description of transformer used with system shown in Fig. 92).

TRANSFORMER, power: plate; Primary 220 volt 3 phase or 380 to 415 volt 3 phase, 60 cps; secondary tapped for output voltage of 2,000, 3,000, 3,500 and 4,000; delivers 4,000 volts at 3 amperes; 8000 volt test; 13.8 kilovolt amperes; metal case dimensions 25" x 15" x 18-1/4"; Chicago Transformer No. S-14293; Wilcolec #43023. (This transformer used with Rectifier system shown in Fig. 92. See Note top page 36).

TRANSFORMER, power: fil; grade I class A per JAN-T-27; input 210/220/230/240 v, 60 cps, single ph; sec'd, 5 v CT at 8.0 amp (+1 amp DC); HS metal case; 5-5/16" lg x 4-25/32" wd x 6-1/16" h; 8 solder term on bottom; 2 rows 5-3/8" apart of three 15/64" mtg holes at 1-5/8" intervals; -55° to +85°C ambient temp up to 10,000 ft operating altitude; nonoperating up to 35,000 ft; Chi Trans #13367; Wilcolec part #842004.

TRANSFORMER, power: fil; grade I class A per JAN-T-27; input 210/220/230/240 v, 60 cps, single ph; sec'd 5.0 v CT at 24 amp (+3 amp DC); HS metal case; 6-1/8" lg x 5-17/64" wd x 7-1/16" h; 8 solder term on bottom; 2 rows 6" apart of three 17/64" mtg holes at 2-1/8" intervals; -55° to +85°C ambient temp up to 10,000 ft

T-5

T-5

T-6
thru
T-8

T-9

Supplies plate power to 2, 100-volt supply and 4, 200-volt supply rectifiers.

Supplies plate power to 2, 100 volt supply and 4, 200 volt supply rectifiers.

Supplies power to filament of V-4, V-5, and V-6 of 4, 200-volt and 2, 100-volt supplies.

Supplies power to filaments of V-7, V-8 and V-9 of 4, 200-volt supply.

2. Identification Table of Parts for Rectifier Power Unit Model 36D

Symbol	Name of part and description	Function of part
V-1	operating altitude; nonoperating up to 35,000 ft; Chi Trans #13368; Wilcolec part #842005.	-450-volt supply rectifier
V-2 V-3	TUBE, electron: JAN-5U4G. TUBE, electron: JAN-3B28.	525-volt supply rectifiers.
V-4 thru V-9	TUBE, electron: JAN-4B32; rectifier; Chatham Electronics. CAP: receptacle; for Army-Navy type AN connector receptacles, shell size #28; black anodic aluminum body and chain; 1-59/64" diam x 1/2" d w/4-5/8" lg chain; 0.167" diam hole in lug on end of chain; includes soft rubber sealing disk; waterproof; Amphenol #9760-28G; Wilcolec part #88831. (Optional item). CAP: receptacle; for Army-Navy type AN connector receptacles, shell size #36; black anodic aluminum body and chain; 2-7/16" diam x 1/2" d w/5-3/4" lg chain; 0.187" diam hole in lug on end of chain; includes soft rubber sealing disk; waterproof; Amphenol #9760-36G; Wilcolec part #88832. (Optional item).	2,100-volt supply and 4,200-volt supply rectifiers.
O-13 O-14	RELAY, DPDT; contacts rated 200 watts non-inductive ac load; coil 12 vdc, 250 ohms; Advance Electric type K1604; Wilcolec #11562. (Schematic diagram Fig. 92; not shown in schematic diagram Fig. 94. Also see note top page 40). TERMINAL BOX: blue wrinkle painted steel; hinged cover; rectangular, 12" h x 8-1/4" wd x 3" d excluding handle; four 7/32" diam holes on 10-25/32" x 7-1/32" mtg/c; connector shell, AN size #24, mtg one end, with 7/8" diam knockout in same end; includes two 10 cont and one 3 cont barrier type term strips inside; term markings screened in box; u/w Rectifier Power Unit Model 36D; Wilcolec part #96135. (Optional item).	START-STOP relays controlling O-2.
W-1	CABLE ASSEMBLY, special purpose: term board to receptacle plate; all wires color-coded type SRIR per JAN-C-76; three #6 cond, six #22 shielded-pair cond,	

one #18 cond, three #22 cond; 5 ft lg excluding terminations; includes J4 and J5 connectors #AN3102-36-14S and #AN3102-28-6P with cap and chain for each, all mtd on 3-3/4" x 7" x 0.047" painted steel plate one end, other end terminated with three Thomas & Betts #6A3 wedge-on lugs and Thomas & Betts #A77G stakon lugs on other; for Rectifier Power Unit Model 36D; Wilcolec part #32845. (Optional item).

W-2

CABLE ASSEMBLY, special purpose: term box to rectifier power unit; 16 cond, color-coded, including six #22 stranded twisted pairs in overall shielded braid, one #18 stranded cond and three #22 stranded cond, each cond rubber ins; overall Buna-S jacket; 20 ft lg excluding terminations; one end terminated in #AN3106-36-14P connector (P4), other end with 16 Thomas & Betts lugs #AX33G and one Sherman #26 lug; u/w Rectifier Power Unit Model 36D; Wilcolec part #32847. (Optional item).

W-3

CABLE ASSEMBLY, special purpose: rectifier power; 3 cond, color-coded, #6 AWG, stranded, each cond rubber ins, Buna S jacket overall; 20 ft lg excluding terminations; one end terminated in #AN3106-28-6S connector (P5), other end with 3 Thomas & Betts #6A3 wedge-on lugs; u/w Rectifier Power Unit Model 36D; Wilcolec part #32846. (Optional item).

INSTALLATION KIT: for installation and interconnection of one Rectifier Power Unit Model 36D; 5 Radio Transmitter Model 196D; and one Modulator Type 50H; includes six 18-1/2 ft lg #18 AWG 15,000 v wire, one 20 ft lg #18 AWG JAN type SRHV 2500 v wire, 14 assorted sizes and lg. JAN type SRIR 1000 v wire, and 6 assorted lg #22 AWG twisted pairs of JAN type SRIR 1000 v wire, all color-coded; wrenches, reamer, ratchet brace, lug screws, and other hardware; Wilcolec part #68015. (Optional equipment).

- NOTES -

APPENDIX II

WIRE LIST FOR INTERCONNECTION DIAGRAM

See end of this appendix for guide to abbreviations.

Refer to interconnection wiring diagram, figure 93, for small layout showing complete 10-channel station with all units designated (TV, TIV, - - - RI, M, R11, TVI, etc.) for use with column 1 references below.

Columns 1 and 2 references are to characters appearing on chassis, terminal boards, etc.

Modulator leads all appear on other sheets.

Columns 7 and 8 show lugs to be applied to ends of leads. Lugs are packaged by types with part number appearing on each package.

Wire lead		Wire size	Color code	Voltage rating	Cutting length	Wilcox terminal No.	
Start	Destination					Start	Destination
TI-1	RI-Gnd	18	Blk	1000	5-1/2 ft	25012	25011
TI-2	RIE14-12V	18	Wh	1000	7-1/2 ft	25012	25012
TI-3							
TI-4	RIE6-Ph 1	14	Gray	1000	9-1/2 ft	25010	25009
TI-5	RIE6-Ph 2	14	Gray-w. Blk	1000	9-1/2 ft	25010	25009
TI-6							
TI-7	RI-E 1	22	Red-w. wh	1000	5-1/2 ft	25012	25011
TI-8	(See TII-9)						
TI-9	M-44	18	Wh-w. br.	1000	8 ft	25012	25012
TI-10	RI-E2	22	Red	1000	5-1/2 ft	25012	25011
TI-11	M-11	18	Br	1000	12 ft	25012	25012
TI-12	M-6	18	Gray-w. blk	1000	12 ft	25012	25012
TI-13	RIE14-TL 1	22	Wh	1000	9-1/2 ft	25012	25012
TI-14	RIE14-TL 1	22	Wh-w. blk	1000	Sh'd pair		
TI-E5	RI-E5	18	Red	2500	5-1/2 ft	25011	25011
TI-E6	RI-E7	18	Yel	15000	8-1/2 ft	25011	25012
TII-1	TI-1	18	Blk	1000	20 in.	25012	25012
TII-2	TII-1	18	Wh	1000	20 in.	25012	25012
TII-3							
TII-4	RIE6-Ph 1	14	Gray	1000	10-1/2 ft	25010	25009
TII-5	RIE6-Ph 3	14	Gray-w. yel	1000	10-1/2 ft	25010	25009

Wire lead		Wire Size	Color code	Voltage rating	Cutting length	Wilcox terminal No.	
Start	Destination					Start	Destination
TH-6							
TH-7	TI-7	22	Red-w. wh	1000	20 in.	25012	25012
TH-8	(See THH-9)						
TH-9	TI-8	18	Wh-w. blk	1000	20 in.	25012	25012
TH-10	TI-10	22	Red	1000	20 in.	25012	25012
TH-11	M-12	18	Br-w. wh	1000	13 ft.	25012	25012
TH-12	M-7	18	Gray-w red	1000	13 ft	25012	25012
TH-13	RIE14-TL 2	22	Wh-w br	1000	10-1/2 ft	25012	25012
TH-14	RIE14-TL 2	22	Wh-w. gray	1000	Sh'd pair		
TH-E5	TI-E5	18	Red	2500	20 in.	25011	25011
TH-E6	RI-E8	18	Wh	15000	9 ft	25011	25012
THH-1	THH-1	18	Blk	1000	20 in.	25012	25012
THH-2	THH-2	18	Wh	1000	20 in.	25012	25012
THH-3							
THH-4	RIE6-Ph 2	14	Gray-w. blk	1000	11-1/2 ft	25010	25009
THH-5	RIE6-Ph 3	14	Gray-w. yel	1000	11-1/2 ft	25010	25009
THH-6							
THH-7	THH-7	22	Red-w. wh	1000	20 in.	25012	25012
THH-8	(See TIV-9)						
THH-9	THH-8	18	Wh-w. blk	1000	20 in.	25012	25012
THH-10	THH-10	22	Red	1000	20 in.	25012	25012
THH-11	M-13	18	Blue-w. yel	1000	14 ft	25012	25012
THH-12	M-8	18	Gray-w. yel	1000	14 ft	25012	25012
THH-13	RIE14-TL 3	22	Wh-w. red	1000	11-1/2 ft	25012	25012
THH-14	RIE14-TL 3	22	Wh-w. pur	1000	Sh'd pair		
THH-E5	THH-E5	18	Red	2500	20 in.	25011	25011
THH-E6	RI-E9	18	Gr	15000	9-1/2 ft	25011	25012
TIV-1	THH-1	18	Blk	1000	20 in.	25012	25012
TIV-2	THH-2	18	Wh	1000	20 in.	25012	25012
TIV-3							
TIV-4	RIE6-Ph 1	14	Gray	1000	12-1/2 ft	25010	25009
TIV-5	RIE6-Ph 3	14	Gray-w. yel	1000	12-1/2 ft	25010	25009

Wire lead		Wire Size	Color code	Voltage rating	Cutting length	Wilcox terminal No.	
Start	Destination					Start	Destination
TIV-6							
TIV-7	THH-7	22	Red-w. wh	1000	20 in.	25012	25012
TIV-8	(See TV-9)						
TIV-9	THH-8	18	Wh-w. blk	1000	20 in.	25012	25012
TIV-10	THH-10	22	Red	1000	20 in.	25012	25012
TIV-11	M-14	18	Blue-w. gr	1000	15 ft	25012	25012
TIV-12	M-9	18	Gray-w. bl	1000	15 ft	25012	25012
TIV-13	RIE14-TL 4	22	Wh-n. or	1000	12-1/2 ft	25012	25012
TIV-14	RIE14-TL 4	22	Wh-w. bl	1000	Sh'd pair		
TIV-E5	THH-E5	18	Red	2500	20 in.	25011	25011
TIV-E6	RI-E10	18	Blk	15000	10-1/2 ft	25011	25012
TV-1	TIV-1	18	Blk	1000	20 in.	25012	25012
TV-2	TIV-2	18	Wh	1000	20 in.	25012	25012
TV-3							
TV-4	RIE6-Ph 1	14	Gray	1000	13-1/2 ft	25010	25009
TV-5	RIE6-Ph 3	14	Gray-w. yel	1000	13-1/2 ft	25010	25009
TV-6							
TV-7	TIV-7	22	Red-w. wh	1000	20 in.	25012	25012
TV-8	RIE14-Top Intlk	18	Wh-w. blk	1000	13 ft	25012	25012
TV-9	TIV-8	18	Wh-w. blk	1000	20 in	25012	25012
TV-10	TIV-10	22	Red	1000	20 in	25012	25012
TV-11	M-15	18	Blue	1000	16 ft	25012	25012
TV-12	M-10	18	Gray	1000	16 ft	25012	25012
TV-13	RIE14-TL 5	22	Wh-w. gr	1000	13-1/2 ft	25012	25012
TV-14	RIE14-TL 5	22	Wh-w. yel	1000	Sh'd pair		
TV-E5	TIV-E5	18	Red	2500	20 in.	25011	25011
TV-E6	RI-E11	18	Br	15000	11 ft	25011	25012
TVI-1	RII-Gnd	18	Blk	1000	5-1/2 ft	25012	25011
TVI-2	RIIE14-12V	18	Wh	1000	7-1/2 ft	25012	25012
TVI-3							
TVI-4	RIIE6-Ph 1	14	Gray	1000	9-1/2 ft	25010	25009

Wire lead		Wire size	Color code	Voltage rating	Cutting length	Wilcox terminal No.	
Start	Destination					Start	Destination
TVI-5	RHIE6-Ph 2	14	Gray-w. blk	1000	9-1/2 ft	25010	25009
TVI-6							
TVI-7	RH-E1	22	Red-w. wh	1000	5-1/2 ft	25012	25011
TVI-8	(See TVII-9)						
TVI-9	M-44	18	Wh-w. br	1000	8 ft	25012	25012
TVI-10	RH-E2	22	Red	1000	5-1/2 ft	25012	25011
TVI-11	M-29	18	Br	1000	12 ft	25012	25012
TVI-12	M-24	18	Gray-w blk	1000	12 ft	25012	25012
TVI-13	RHIE14-TL 1	22	Wh	1000	9-1/2 ft	25012	25012
TVI-14	RHIE14-TL 1	22	Wh-w. blk	1000	Sh'd pair		
TVI-E5	RH-E5	18	Red	2500	5-1/2 ft	25011	25011
TVI-E6	RH-E7	18	Yel	15000	8-1/2 ft	25011	25012
TVII-1	TVI-1	18	Blk	1000	20 in.	25012	25012
TVII-2	TVII-1	18	Wh	1000	20 in.	25012	25012
TVII-3							
TVII-4	RHIE6-Ph 1	14	Gray	1000	10-1/2 ft	25010	25009
TVII-5	RHIE6-Ph 3	14	Gray-w. yel	1000	10-1/2 ft	25010	25009
TVII-6							
TVII-7	TVI-7	22	Red-w. wh	1000	20 in.	25012	25012
TVII-8	(See TVIII-9)						
TVII-9	TVI-8	18	Wh-w. blk	1000	20 in.	25012	25012
TVII-10	TVI-10	22	Red	1000	20 in.	25012	25012
TVII-11	M-30	18	Br-w. wh	1000	13 ft	25012	25012
TVII-12	M-25	18	Gray-w. red	1000	13 ft	25012	25012
TVII-13	RVIE14-TL 2	22	Wh-w. br	1000	10-1/2 ft	25012	25012
TVII-14	RVIE14-TL 2	22	Wh-w. gray	1000	Sh'd pair		
TVII-E5	TVI-E5	18	Red	2500	20 in.	25011	25011
TVII-E6	RH-E8	18	Wh	15000	9 ft	25011	25012
TVIII-1	TVII-1	18	Blk	1000	20 in.	25012	25012
TVIII-2	TVII-2	18	Wh	1000	20 in.	25012	25012
TVIII-3							
TVIII-4	RHIE6-Ph 2	14	Gray-w. blk	1000	11-1/2 ft	25010	25009

Wire lead		Wire size	Color code	Voltage rating	Cutting length	Wilcox terminal No.	
Start	Destination					Start	Destination
TVIII-5	RHE6-Ph 3	14	Gray-w. yel	1000	11-1/2 ft	25010	25009
TVIII-6							
TVIII-7	TVII-7	22	Red-w. wh	1000	20 in.	25012	25012
TVIII-8	(See TIX-9)						
TVIII-9	TVII-8	18	Wh-w. blk	1000	20 in.	25012	25012
TVIII-10	TVII-10	22	Red	1000	20 in.	25012	25012
TVIII-11	M-31	18	Blue-w. yel	1000	14 ft	25012	25012
TVIII-12	M-26	18	Gray-w. yel	1000	14 ft	25012	25012
TVIII-13	RHE14-TL 3	22	White-w. red	1000	11-1/2 ft	25012	25012
TVIII-14	RHE14-TL 3	22	White-w. pur	1000	Sh'd pair		
TVIII-E5	TVII-E5	18	Red	2500	20 in.	25011	25011
TVIII-E6	RII-E9	18	Green	15000	9-1/2 ft	25011	25012
TIX-1	TXIII-1	18	Blk	1000	20 in.	25012	25012
TIX-2	TVIII-2	18	Wh	1000	20 in.	25012	25012
TIX-3							
TIX-4	RHE6-Ph 1	14	Gray	1000	12-1/2 ft	25010	25009
TIX-5	RHE6-Ph 3	14	Gray-w. yel	1000	12-1/2 ft	25010	25009
TIX-6							
TIX-7	TVIII-7	22	Red-w. wh	1000	20 in.	25012	25012
TIX-8	(See TX-9)						
TIX-9	TVIII-8	18	White-w. blk	1000	20 in.	25012	25012
TIX-10	TVIII-10	22	Red	1000	20 in.	25012	25012
TIX-11	M-32	18	Blue-w. gr	1000	15 ft	25012	25012
TIX-12	M-27	18	Gray-w. bl	1000	15 ft	25012	25012
TIX-13	RHE14-TL 4	22	White-w. or	1000	12-1/2 ft	25012	25012
TIX-14	RHE14-TL 4	22	White-w. bl	1000	Sh'd pair		
TIX-E5	TVIII-E5	18	Red	2500	20 in.	25011	25011
TIX-E6	RII-E10	18	Black	15000	10-1/2 ft	25011	25012
TX-1	TIX-1	18	Black	1000	20 in.	25012	25012
TX-2	TIX-2	18	White	1000	20 in.	25012	25012
TX-3							
TX-4	RHE6-Ph 1	14	Gray	1000	13-1/2 ft	25010	25009

Wire lead		Wire size	Color code	Voltage rating	Cutting length	Wilcox terminal No.	
Start	Destination					Start	Destination
TX-5	RIIE6-Ph 3	14	Gray-w. yel	1000	13-1/2 ft	25010	25009
TX-6							
TX-7	TIX-7	22	Red-w. wh	1000	20 in.	25012	25012
TX-8	RIIE14-top Intlk	18	White-w. blk	1000	13 ft	25012	25012
TX-9	TIX-8	18	White-w. blk	1000	20 in.	25012	25012
TX-10	TIX-10	22	Red	1000	20 in.	25012	25012
TX-11	M-33	18	Blue	1000	16 ft	25012	25012
TX-12	M-28	18	Gray	1000	16 ft	25012	25012
TX-13	RIIE14-TL 5	22	White-w. gr	1000	13-1/2 ft	25012	25012
TX-14	RIIE14-TL 5	22	White-w. yel	1000	Sh'd pair		
TX-E5	TIX-E5	18	Red	2500	20 in.	25011	25011
TX-E6	RII-E11	18	Brown	15000	11 ft	25011	25012
RIE14-MP-top							
RIE14-MP-ctr	ME1-35	14	Gray-w blk	1000	14-1/2 ft	25010	25010
RIE14-MP-bot	ME1-36	14	Gray-w. yel	1000	14-1/2 ft	25010	25010
RIE14-Start- Top	RIJ4-U	22	Gray-n. wh	1000	6 ft	25012	AN3102-36-1S
RIE14-Start- Stop	RIJ4-V	22	Gray-w. red	1000	6 ft	25012	AN3102-36-1S
RIE14-Stop- bot	RIJ4-W	22	Gray-w. bl	1000	6 ft	25012	AN3102-36-1S
RIE14-+12V- bot	ME1-41	14	Wh-w. red	1000	15 ft	25010	25010
RIE14- -12V- bot	ME1-43	14	White	1000	15 ft	25010	25010
RIE14-Intlk- top	TV-8	(See TV List)					
RIE14-Intlk- bot							
RIE14-Tran- Lines		(See TI-TV List, inc.)					
RIE14-MS-1	ME1-1	22	Wh-n. blk	1000	15 ft	25012	25012
RIE14-MS-2	ME1-2	22	Wh-n. br	1000	15 ft	25012	25012
RIE14-MS-3	ME1-3	22	Wh-n. red	1000	15 ft	25012	25012
RIE14-MS-4	ME1-4	22	Wh-n. or	1000	15 ft	25012	25012

Wire lead		Wire size	Color code	Voltage rating	Cutting length	Wilcox terminal No.	
Start	Destination					Start	Destination
R1E14-MS-5	ME1-5	22	Wh-n. gr	1000	15 ft	25012	25012
R1E14-Aud-Top	ME1-37	22	Wh-w. bl	1000	15 ft	25012	25012
R1E14-Aud-bot	ME1-39	22	Wh-w. red	1000	Sh'd pair	25012	25012
R1E14-Aud-Top	RIJ4-J	22	Wh-w. bl	1000	6 ft	25012	AN3102-36-1S
R1E14-Aud-bot	RIJ4-Q	22	Wh-w. red	1000	Sh'd pair	25012	AN3102-36-1S
R1E1-Inpt L-1	RIJ4-A	22	Wh-w. blk	1000	6 ft	25012	AN3102-36-1S
R1E14-Inpt L-1	RIJ4-E	22	Wh	1000	Sh'd pair	25012	AN3102-36-1S
R1E14-Inpt L-2	RIJ4-B	22	Wh-w. br	1000	6 ft	25012	AN3102-36-1S
R1E14-Inpt L-2	RIJ4-F	22	Wh-w. gray	1000	Sh'd pair	25012	AN3102-36-1S
R1E14-Inpt L-3	RIJ4-C	22	Wh-w. red	1000	6 ft	25012	AN3102-36-1S
R1E14-Inpt L-3	RIJ4-G	22	Wh-w. pur	1000	Sh'd pair	25012	AN3102-36-1S
R1E14-Inpt L-4	RIJ4-H	22	Wh-w. or	1000	6 ft	25012	AN3102-36-1S
R1E14-Inpt L-4	RIJ4-N	22	Wh-w. bl	1000	Sh'd pair	25012	AN3102-36-1S
R1E14-Inpt L-5	RIJ4-D	22	Wh-w. gr	1000	6 ft	25012	AN3102-36-1S
R1E14-Inpt L-5	RIJ4-I	22	Wh-w. yel	1000	Sh'd pair	25012	AN3102-36-1S
R1E14-Key							
R1E14-Gnd-Top	RIJ4-T	18	Blk	1000	6 ft	25012	AN3102-36-1S
R1E6-Ph 1	RIJ5-A	6	Gray	1000	7 ft	25004	AN3102-28-6P
R1E6-Ph 1		(See TI-TV Lists, inc.)					
R1E6-Ph 2	RIJ5-B	6	Gray-w. blk	1000	7 ft	25004	AN3102-28-6P
R1E6-Ph 2		(See TI-TV Lists, inc.)					
R1E6-Ph 3	RIJ5-C	6	Gray-w. yel		7 ft	25004	AN3102-28-6P
R1E6-Ph 3		(See TI-TV Lists, inc.)					
R1-Gnd	M-Gnd	18	Blk	1000	7-1/2 ft	25011	25011
R1E1, 2, 5		(See TI-List)					
R1E3	RI-E13	Attached to equipment at factory.					
R1E4	M-E2	18	Red	15000	8 ft	25011	25011
R1E7		(See TI-E6)					
R1E8		(See TII-E6)					

Wire lead		Wire size	Color code	Voltage rating	Cutting length	Wilcox terminal No.	
Start	Destination					Start	Destination
R1E9		(See TIII-E6)					
R1E10		(See TIV-E6)					
R1E11		(See TV-E6)					
R1E12	M-T2-4	18	B1	15000	8 ft.	25011	25011
R1E13	R1-E3	(See R1-E3)					
RIIE14-MP-Top							
RIIE14-MP-ctr	ME1-35	14	Gray-w. blk	1000	14-1/2 ft	25010	25010
RIIE14-MP-bot	ME1-36	14	Gray-w. yel	1000	14-1/2 ft	25010	25010
RIIE14-Start-Top	RIIJ4-U	22	Gray-n. wh	1000	6 ft	25012	AN3102-36-1S
RIIE14-Start-Stop	RIIJ4-V	22	Gray-w. red	1000	6 ft	25012	AN3102-36-1S
RIIE14-Stop-bot	RIIJ4-W	22	Gray-w. bl	1000	6 ft	25012	AN3102-36-1S
RIIE14- +12V-bot	ME1-41	14	Wh-w. red	1000	15 ft	25010	25010
RIIE14- -12V-bot	ME1-43	14	Wh	1000	15 ft	25010	25010
RIIE14-Intlk-top	TX-8	(See TX List)					
RIIE14-Intlk-bot							
RIIE14-Tran-Lines		(See TVI-TX Lists, inc.)					
RIIE14-MS-1	ME1-19	22	Wh-n. blk	1000	15 ft	25012	25012
RIIE14-MS-2	ME1-20	22	Wh-n. br	1000	15 ft	25012	25012
RIIE14-MS-3	ME1-21	22	Wh-n. red	1000	15 ft	25012	25012
RIIE14-MS-4	ME1-22	22	Wh-n. or	1000	15 ft	25012	25012
RIIE14-MS-5	ME1-23	22	Wh-n. gr	1000	15 ft	25012	25012
RIIE14-Aud-Top	ME1-37	22	Wh-w. bl	1000	15 ft	25012	25012
RIIE14-Aud-bot	ME1-39	22	Wh-w. red	1000	Sh'd pair	25012	25012
RIIE14-Aud-Top	RIIJ4-J	22	Wh-w. bl	1000	6 ft	25012	AN3102-36-1S
RIIE14-Aud-bot	RIIJ4-Q	22	Wh-w. red	1000	Sh'd pair	25012	AN3102-36-1S
RIIE14-Inpt L-1	RIIJ4-A	22	Wh-w. blk	1000	6 ft	25012	AN3102-36-1S
RIIE14-Inpt L-1	RIIJ4-E	22	Wh	1000	Sh'd pair	25012	AN3102-36-1S

Wire lead		Wire size	Color code	Voltage rating	Cutting length	Wilcox terminal No.	
Start	Destination					Start	Destination
R1IE14-Inpt L-2	R1IJ4-B	22	Wh-w. br	1000	6 ft	25012	AN3102-36-1S
R1IE14-Inpt L-2	R1IJ4-F	22	Wh-w. gray	1000	Sh'd pair	25012	AN3102-36-1S
R1IE14-Inpt L-3	R1IJ4-C	22	Wh-w. red	1000	6 ft	25012	AN3102-36-1S
R1IE14-Inpt L-3	R1IJ4-G	22	Wh-w. pur	1000	Sh'd pair	25012	AN3102-36-1S
R1IE14-Inpt L-4	R1IJ4-H	22	Wh-w. or	1000	6 ft	25012	AN3102-36-1S
R1IE14-Inpt L-4	R1IJ4-N	22	Wh-w. bl	1000	Sh'd pair	25012	AN3102-36-1S
R1IE14-Inpt L-5	R1IJ4-D	22	Wh-w. gr	1000	6 ft	25012	AN3102-36-1S
R1IE14-Inpt L-5	R1IJ4-I	22	Wh-w. yel	1000	Sh'd pair	25012	AN3102-36-1S
R1IE14-Key							
R1IE14-Gnd-Top	R1IJ4-T	18	Blk	1000	6 ft	25012	AN3102-36-1S
R1IE6-Ph 1	R1IJ5-A	6	Gray	1000	7 ft	25004	AN3102-28-6P
R1IE6-Ph 1		(See TVI-TX List, inc.)					
R1IE6-Ph 2	R1IJ5-B	6	Gray-w. blk	1000	7 ft	25004	AN3102-28-6P
R1IE6-Ph 2		(See TVI-TX List, inc.)					
R1IE6-Ph 3	R1IJ5-C	6	Gray-w. yel		7 ft	25004	AN3102-28-6P
R1IE6-Ph 3		(See TVI-TX List, inc.)					
R1I-Gnd	M-Gnd	18	Blk	1000	7-1/2 ft	25011	25011
R1IE1, 2, 5		(See TVI List.)					
R1IE3	R1I-E13	Attached to equipment at factory.					
R1IE4	M-E4	18	Red	15000	8 ft	25011	25011
R1IE7		(See TVI-E6)					
R1IE8		(See TVII-E6)					
R1IE9		(See TVIII-E6)					
R1IE10		(See TIX-E6)					
R1IE11		(See TX-E6)					
R1IE12	M-T2-4	18	B1	15000	8 ft	25011	25011
R1IE13	R1I-E3	(See R1I-E3)					

GUIDE TO ABBREVIATIONS

TI thru TX.	Model 96D, Transmitters. See small station layout on interconnection diagram.
RI, RII	Model 36D, Rectifier Power Units.
M	Wilcox type 50H Modulator
Ph	Phase.
MP.	Modulator power.
TL.	Transmitter lines.
MS.	Modulator selection.
Aud	Audio.
Intlk.	Interlock.
Inpt L.	Input lines.
Gnd	Ground.
Key	DC Keying.
Bot.	Bottom.
Gray-w. blk.	Gray body color with wide black tracer.
Wh-n. bl	White body color with narrow-blue tracer.
Sh'd pair.	Shielded pair.

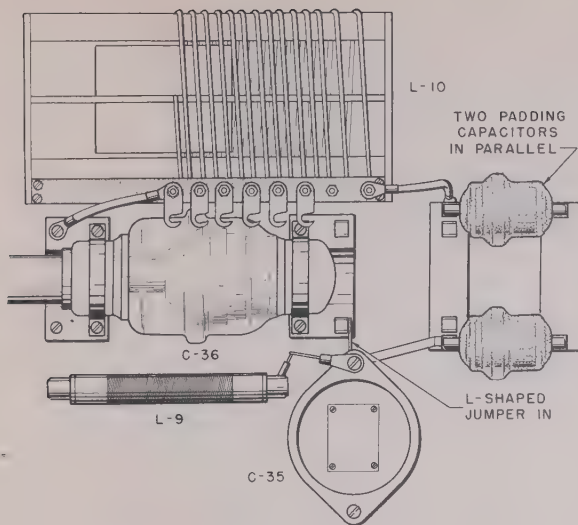


Figure 67. Radio Transmitter Model 96D, final amplifier plate circuit component arrangement for 2.0 to 2.4 mc operation

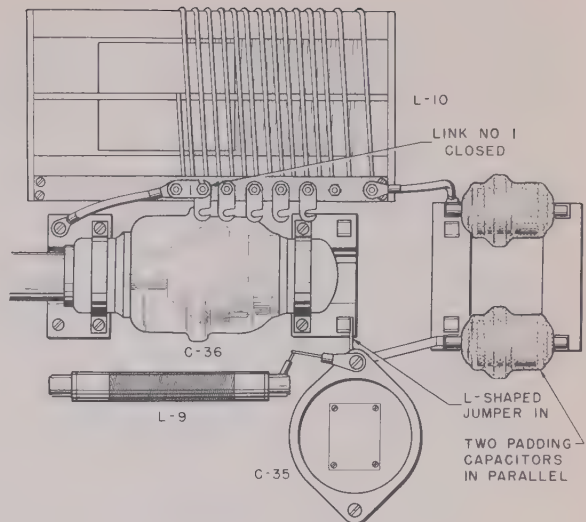


Figure 68. Radio Transmitter Model 96D, final amplifier plate circuit component arrangement for 2.4 to 2.8 mc operation

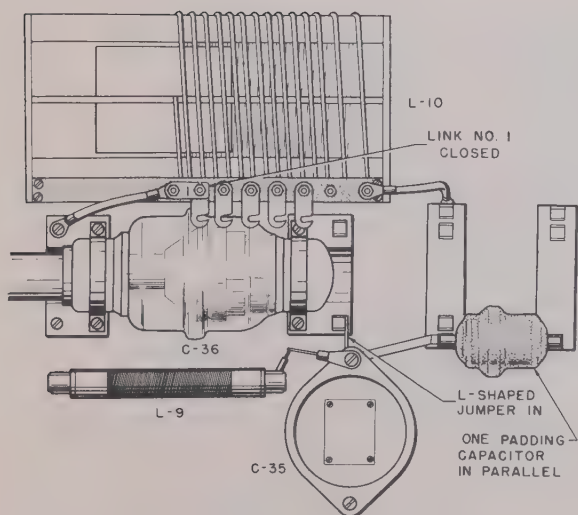


Figure 69. Radio Transmitter Model 96D, final amplifier plate circuit component arrangement for 2.8 to 3.2 mc operation

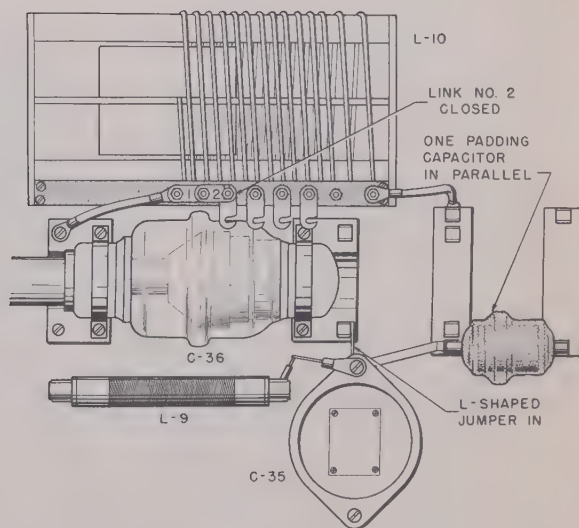


Figure 70. Radio Transmitter Model 96D, final amplifier plate circuit component arrangement for 3.2 to 4.4 mc operation

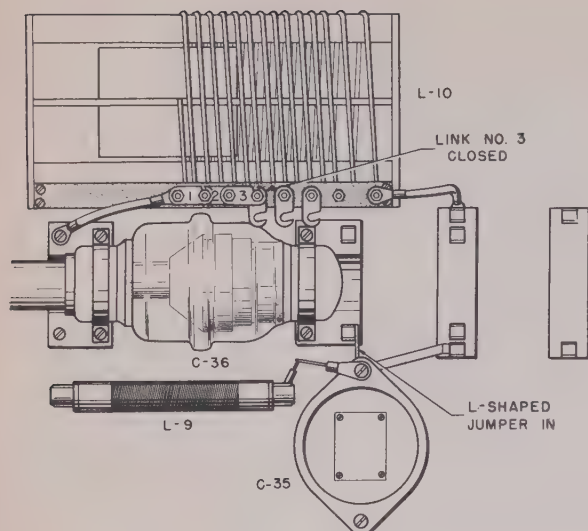


Figure 71. Radio Transmitter Model 96D, final amplifier plate circuit component arrangement for 4.4 to 7.0 mc operation

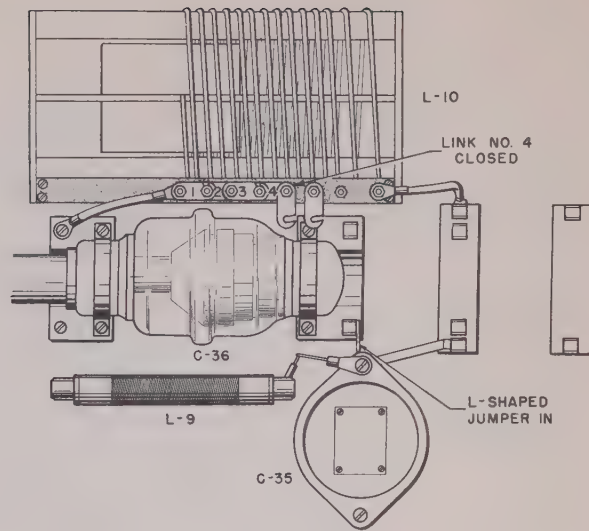


Figure 72. Radio Transmitter Model 96D, final amplifier plate circuit component arrangement for 7.0 to 10.0 mc operation

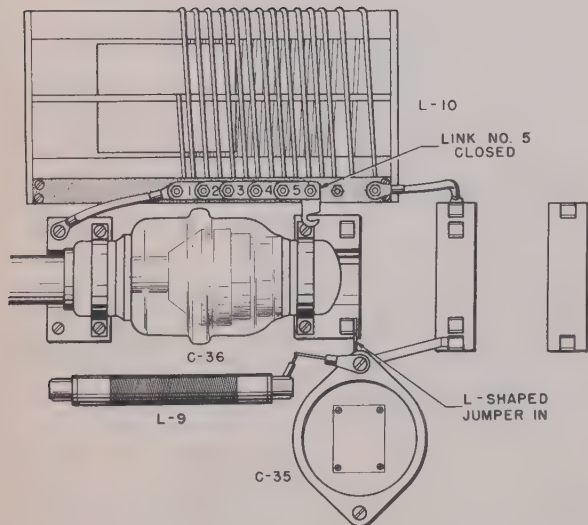


Figure 73. Radio Transmitter Model 96D, final amplifier plate circuit component arrangement for 10.0 to 14.0 mc operation

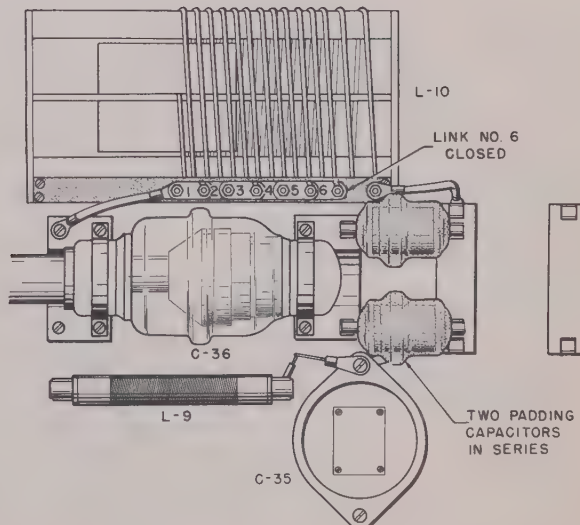


Figure 74. Radio Transmitter Model 96D, final amplifier plate circuit component arrangement for 14.0 to 16.0 mc operation

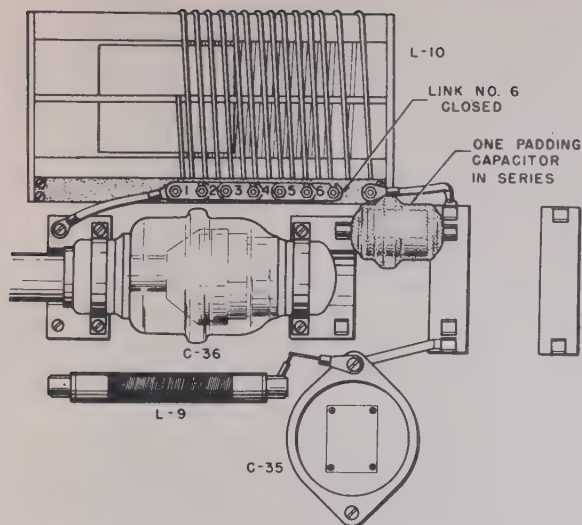


Figure 75. Radio Transmitter Model 96D, final amplifier plate circuit component arrangement for 16.0 to 19.8 mc operation

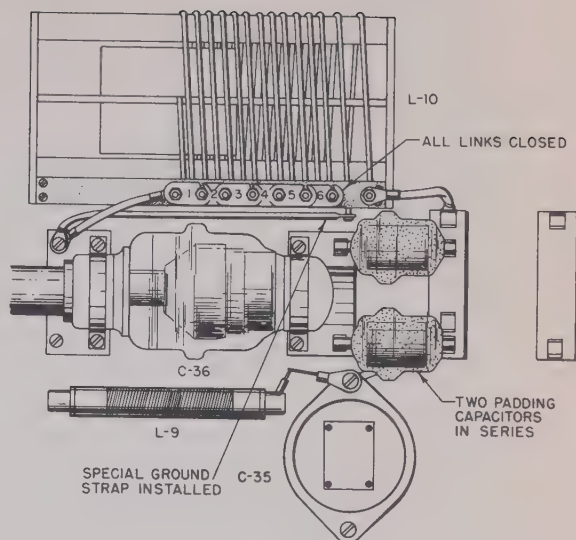


Figure 76. Radio Transmitter Model 96D, final amplifier plate circuit component arrangement for 19.8 to 22.0 mc operation

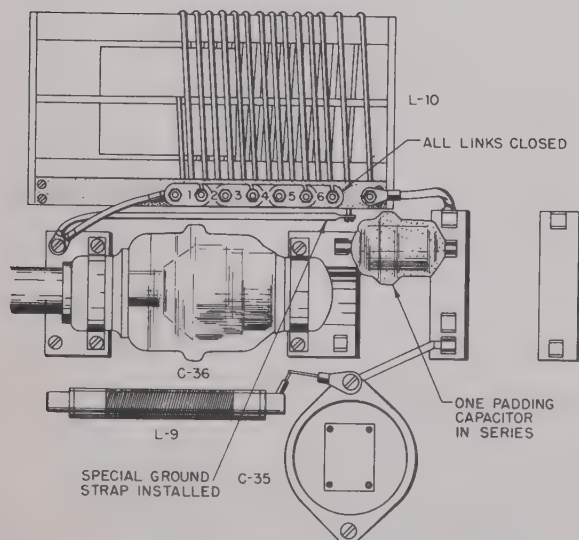


Figure 77. Radio Transmitter Model 96D, final amplifier plate circuit component arrangement for 22.0 to 26.0 mc operation

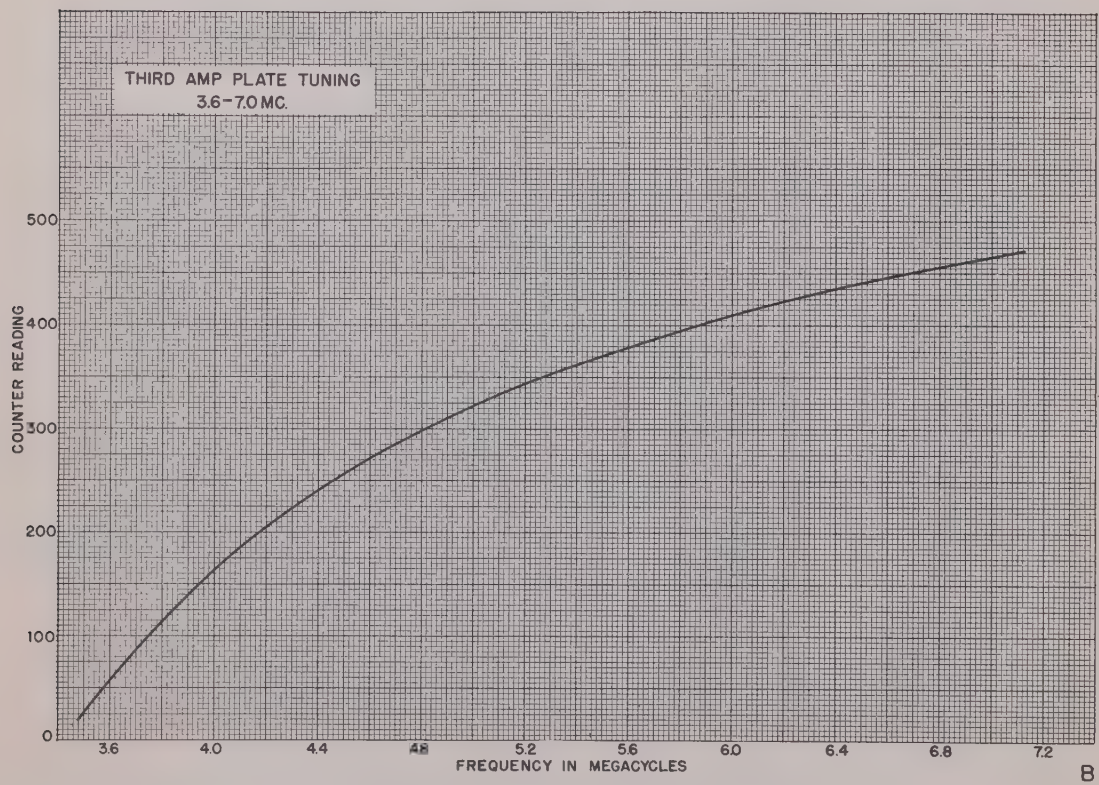
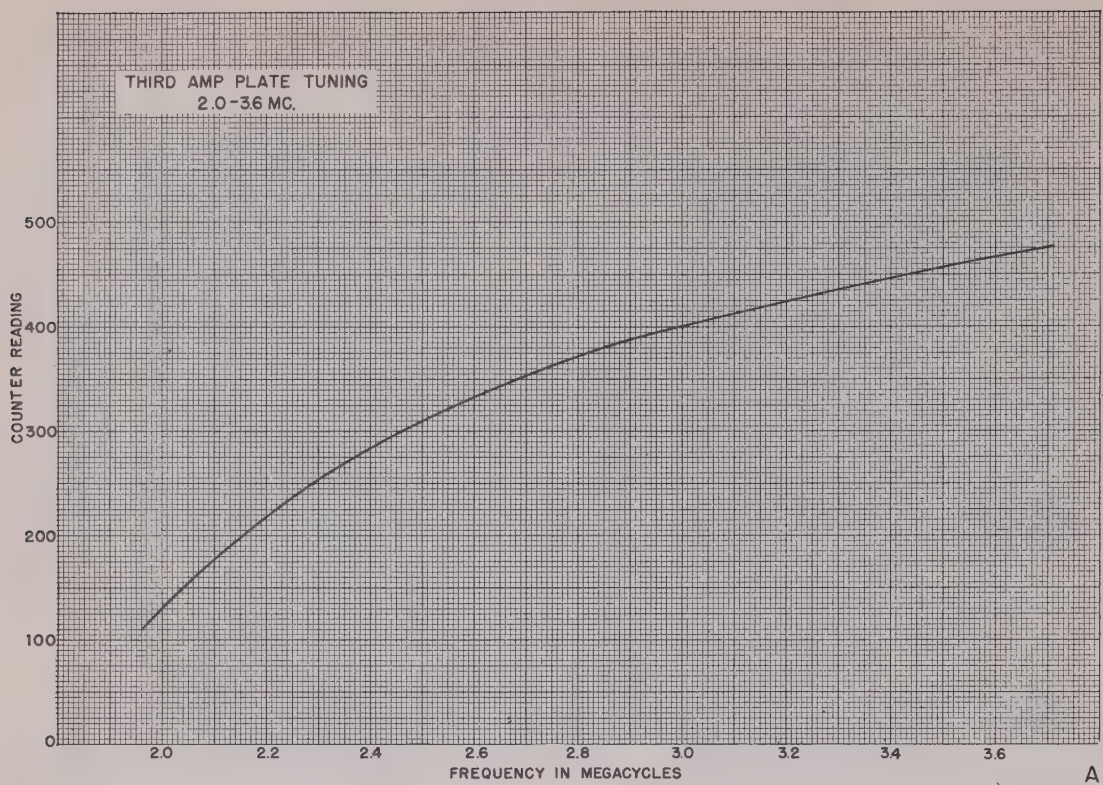


Figure 78. Radio Transmitter Model 96D, third amplifier plate tuning curves for 2.0 to 7.0 mc

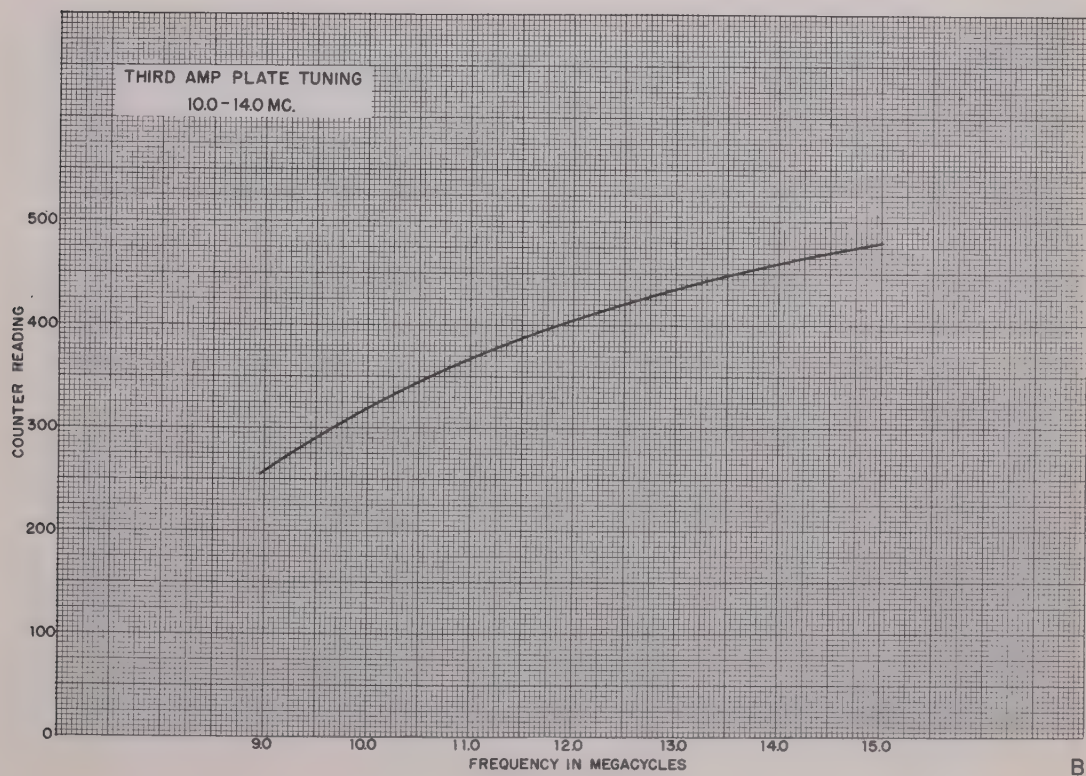
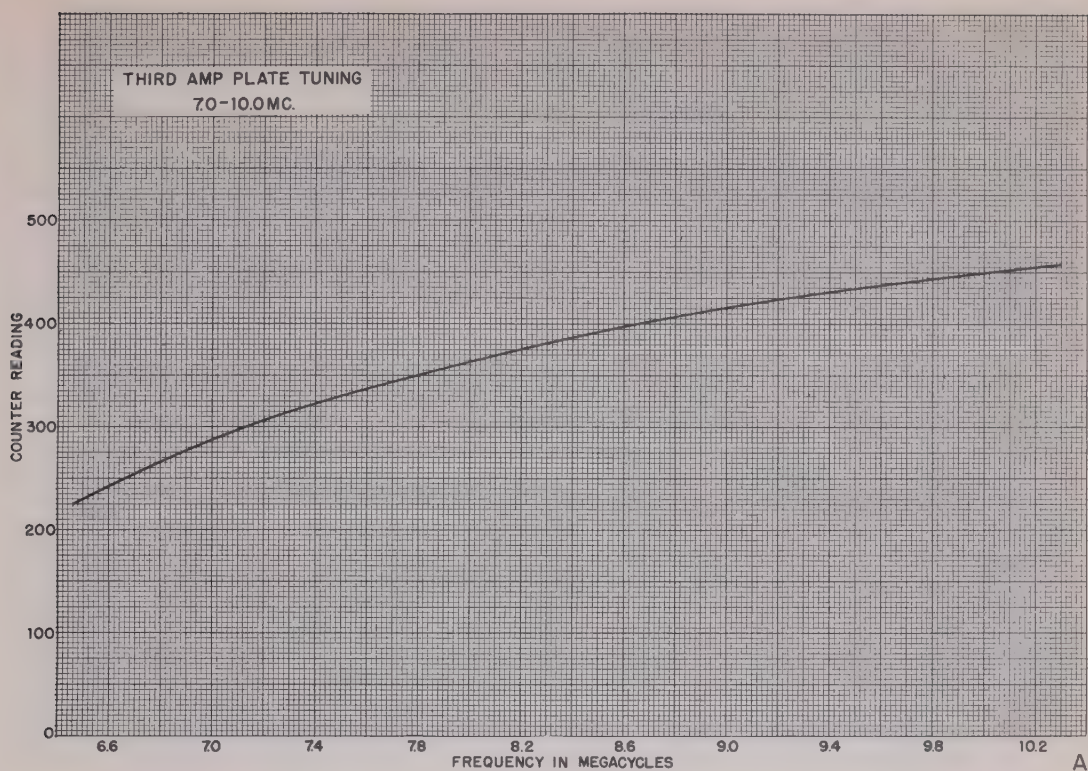


Figure 79. Radio Transmitter Model 96D, third amplifier plate tuning curves for 7.0 to 14.0 mc

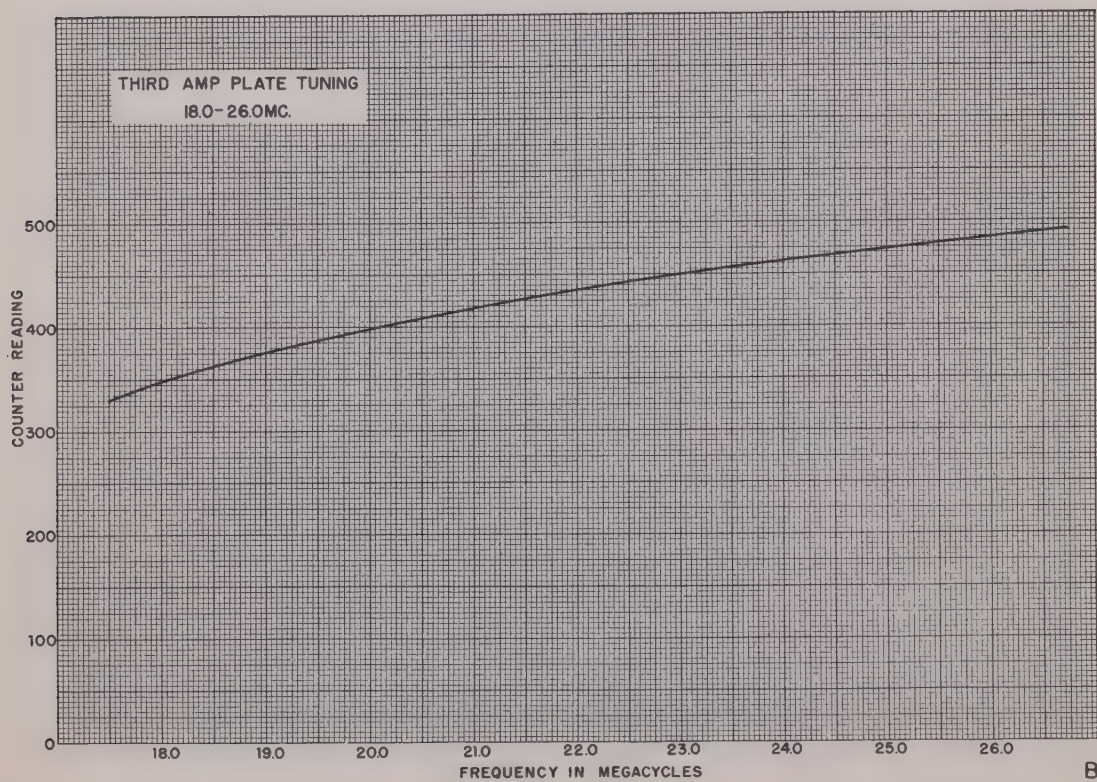
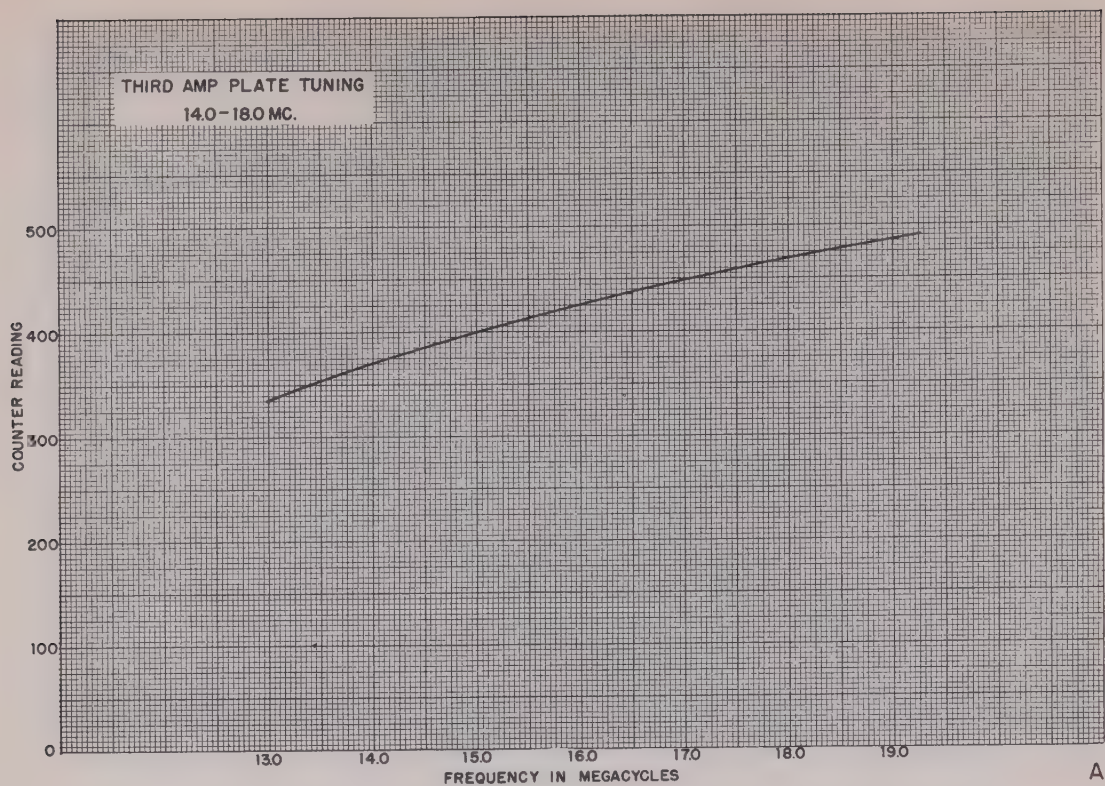


Figure 80. Radio Transmitter Model 96D, third amplifier plate tuning curves for 14.0 to 26.0 mc

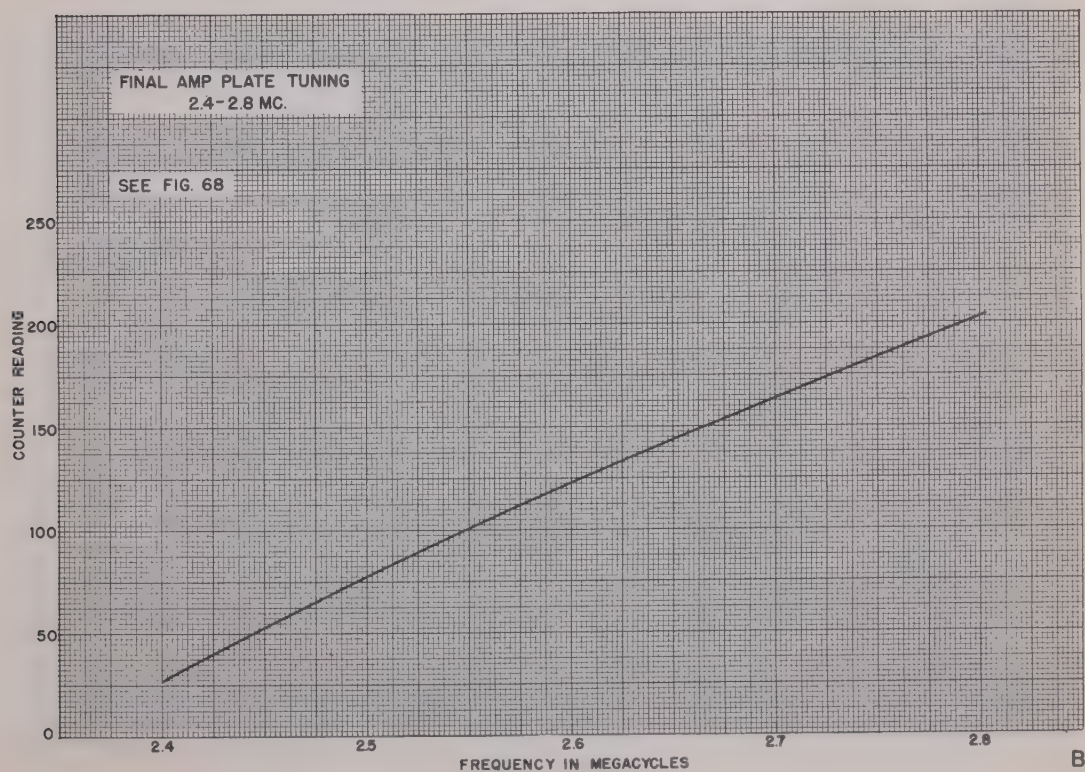
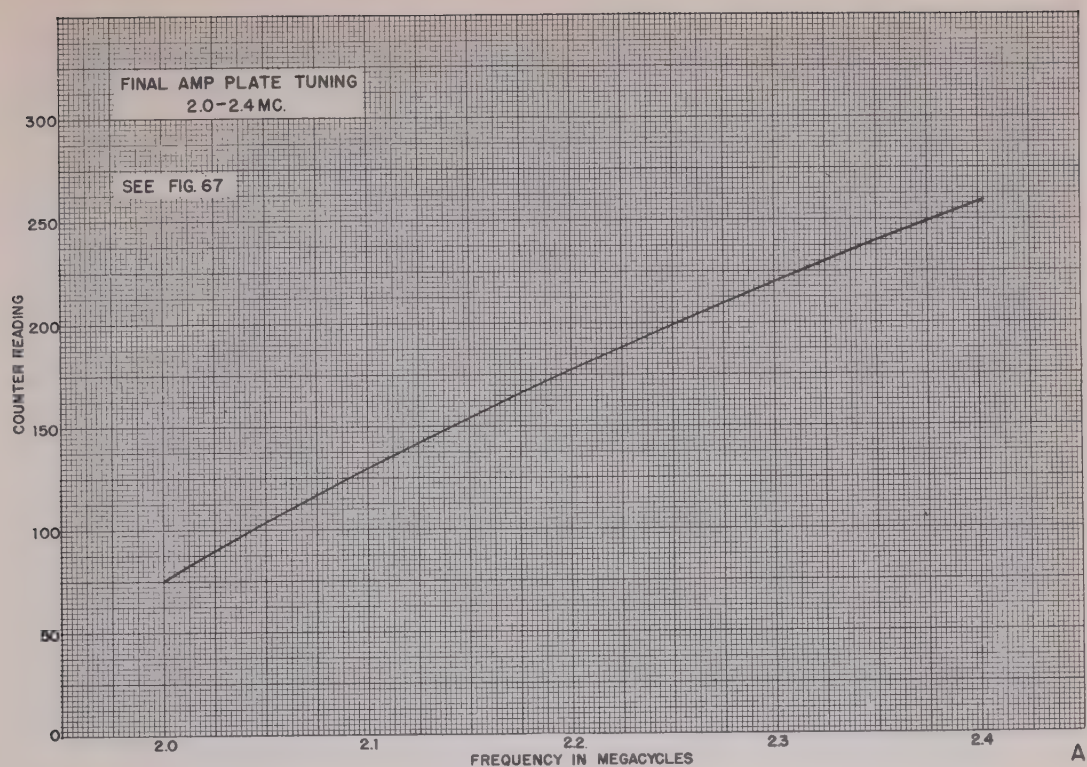


Figure 81. Radio Transmitter Model 96D, final amplifier plate tuning curves for 2.0 to 2.8 mc operation

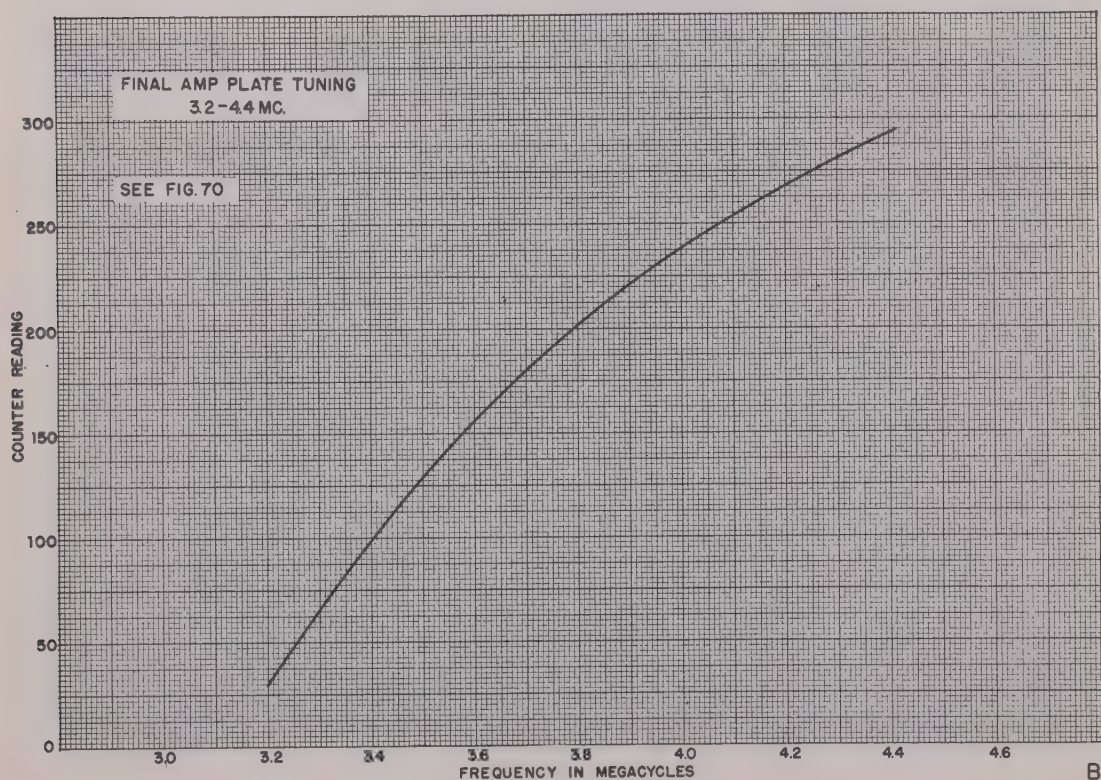
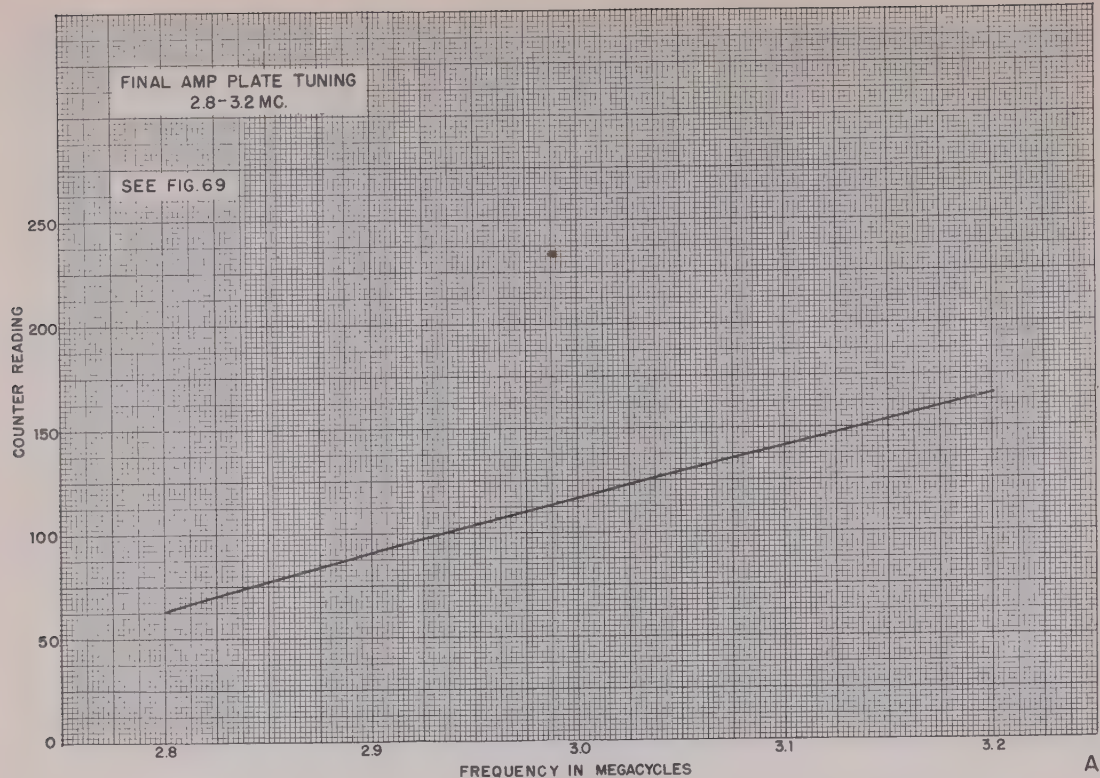


Figure 82. Radio Transmitter Model 96D, final amplifier plate tuning curves for 2.8 to 4.4 mc operation

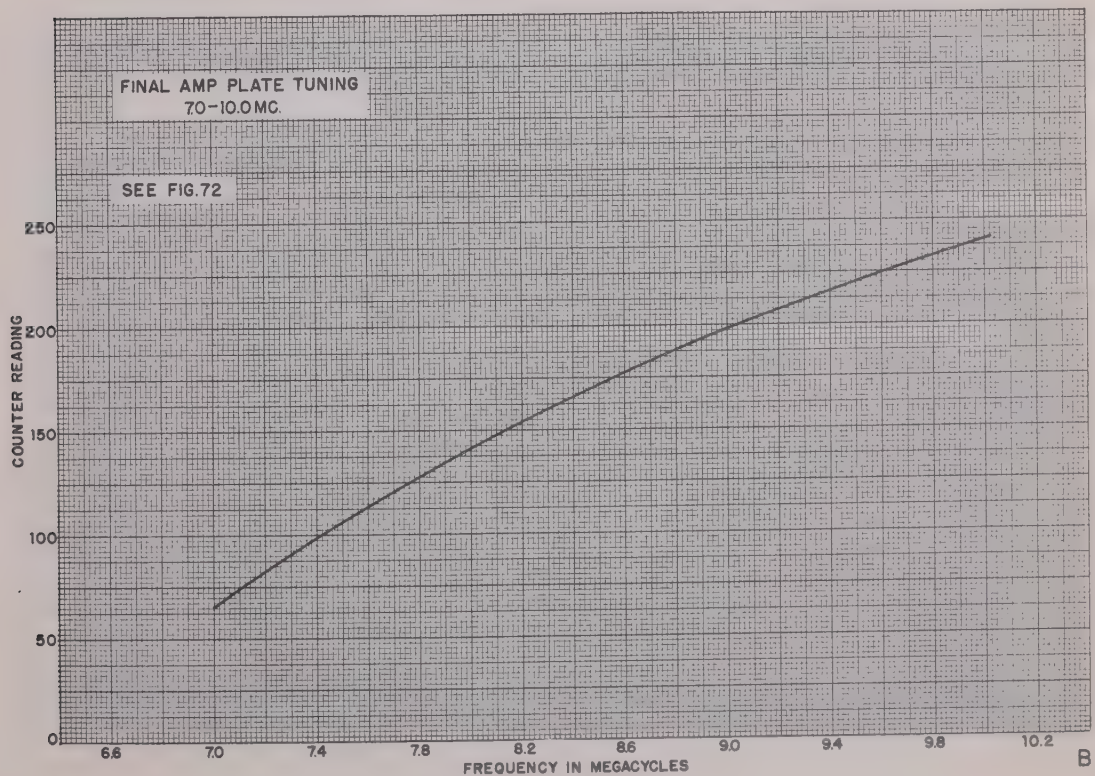
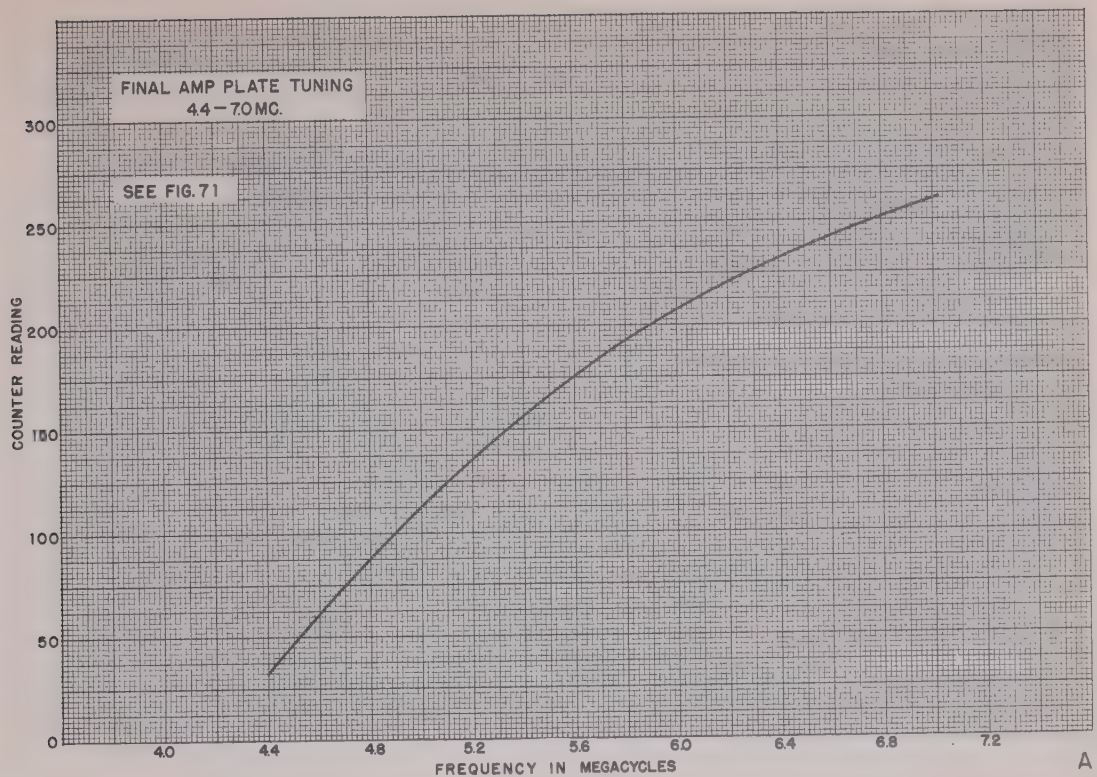


Figure 83. Radio Transmitter Model 96D, final amplifier plate tuning curves for 4.4 to 10.0 mc operation

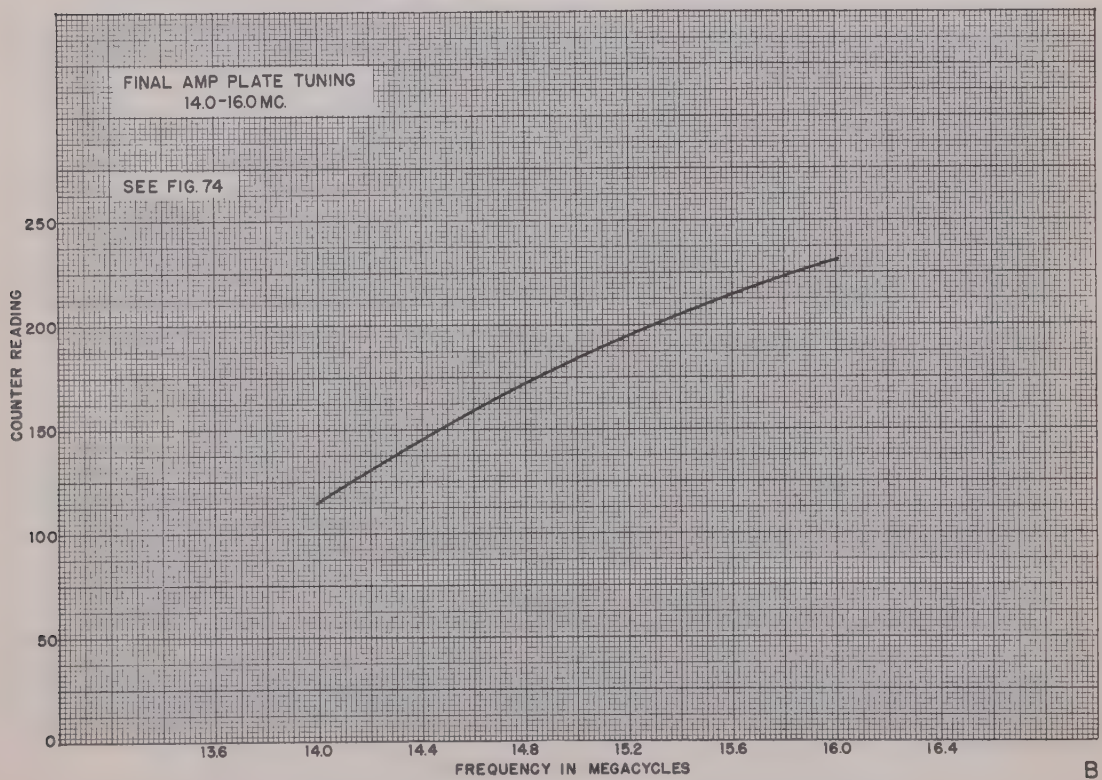
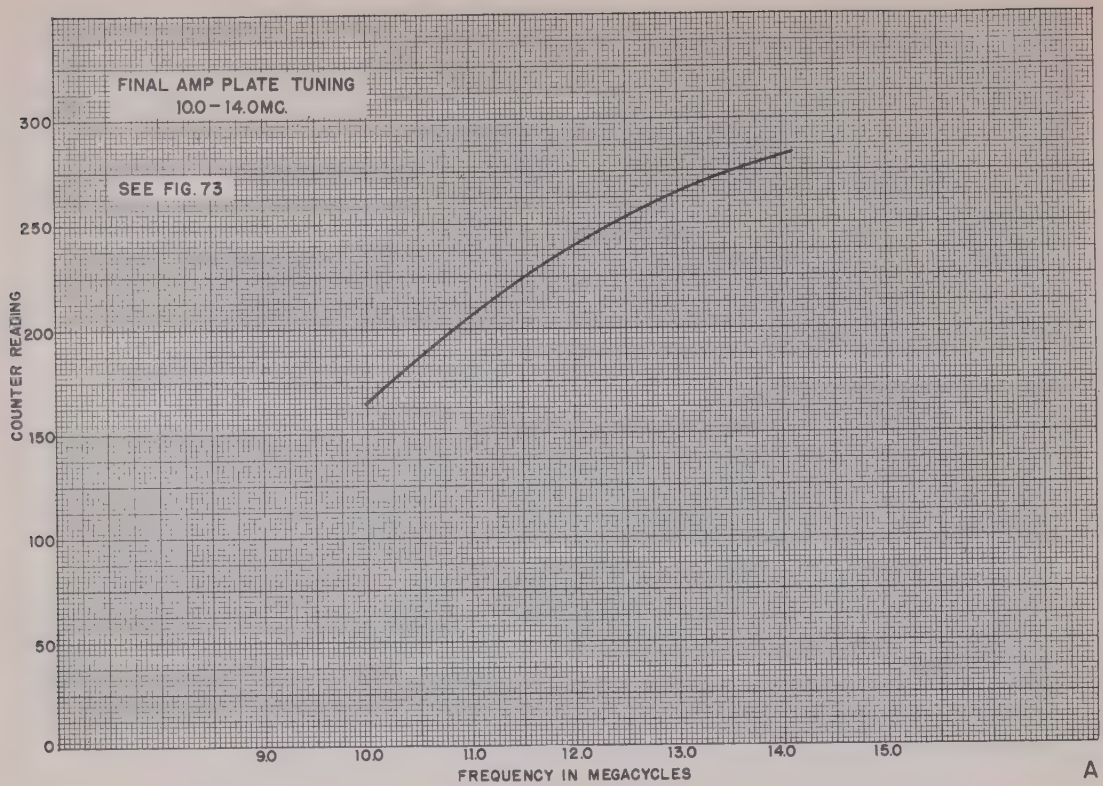


Figure 84. Radio Transmitter Model 96D, final amplifier plate tuning curves for 10.0 to 16.0 mc operation

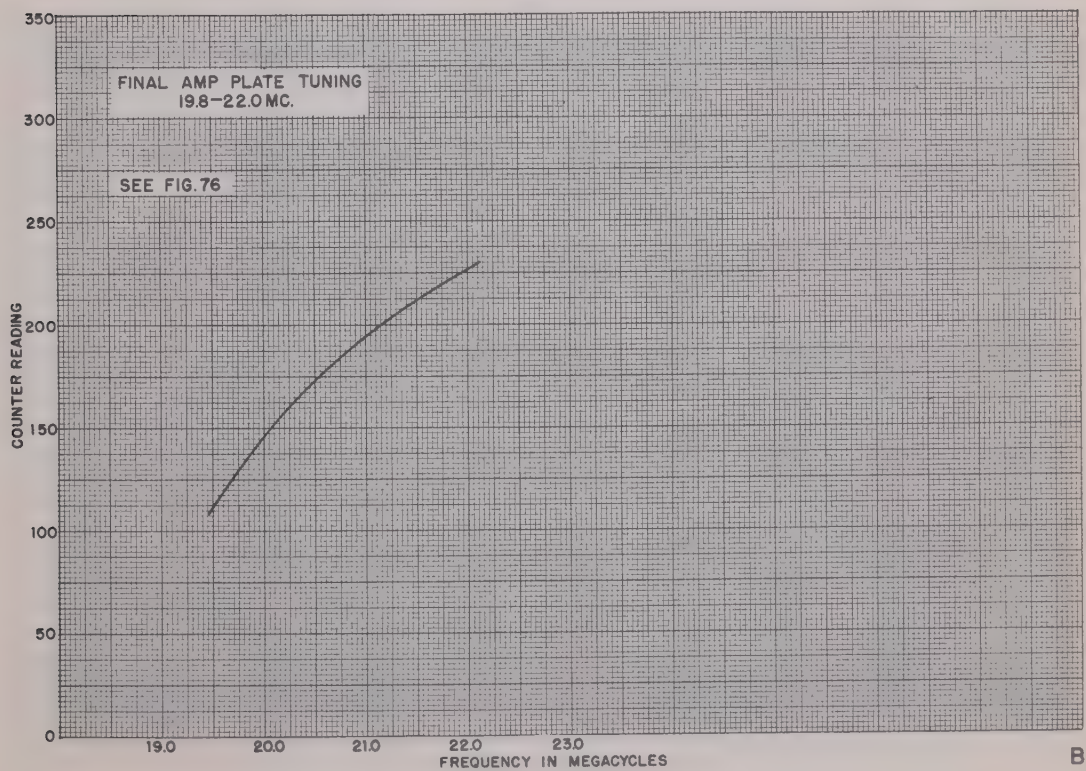
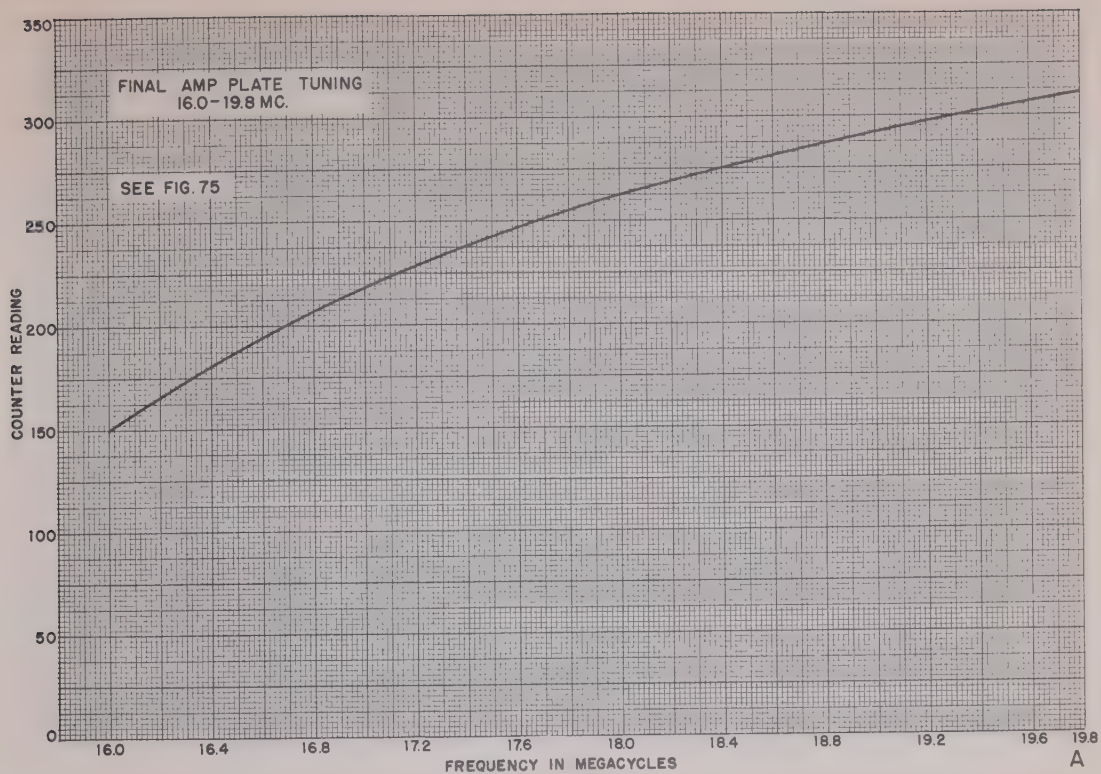


Figure 85. Radio Transmitter Model 96D, final amplifier plate tuning curves for 16.0 to 22.0 mc operation

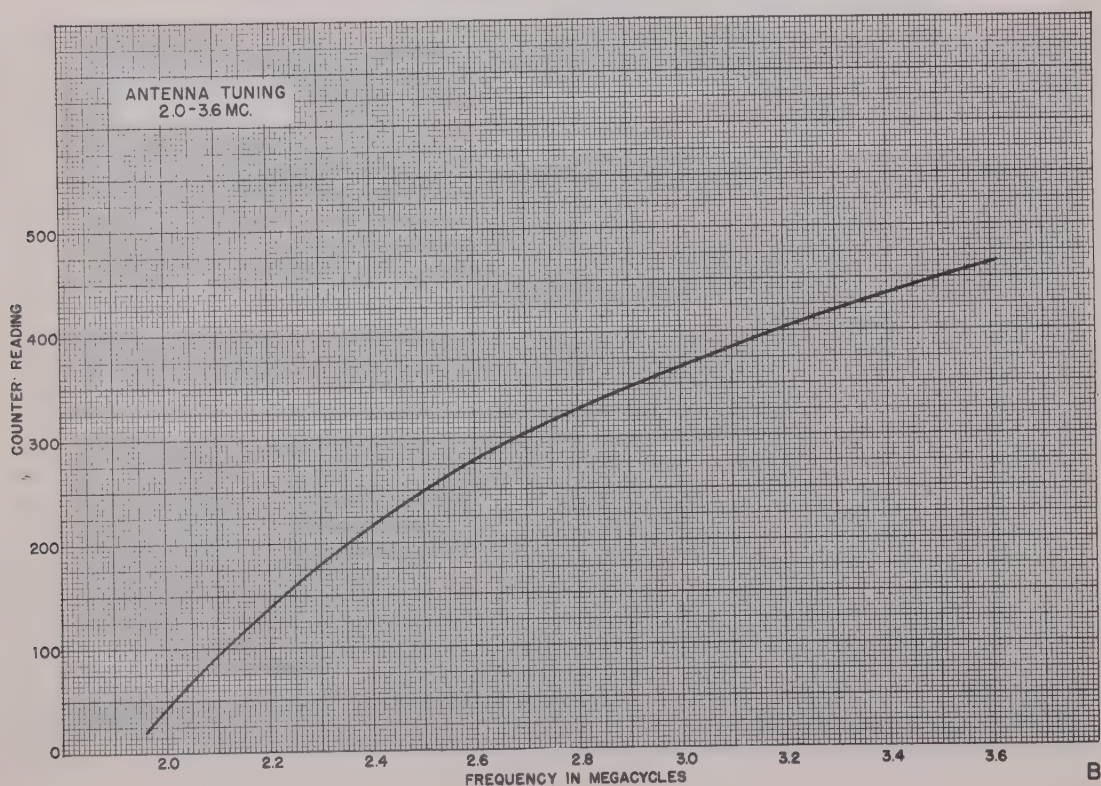
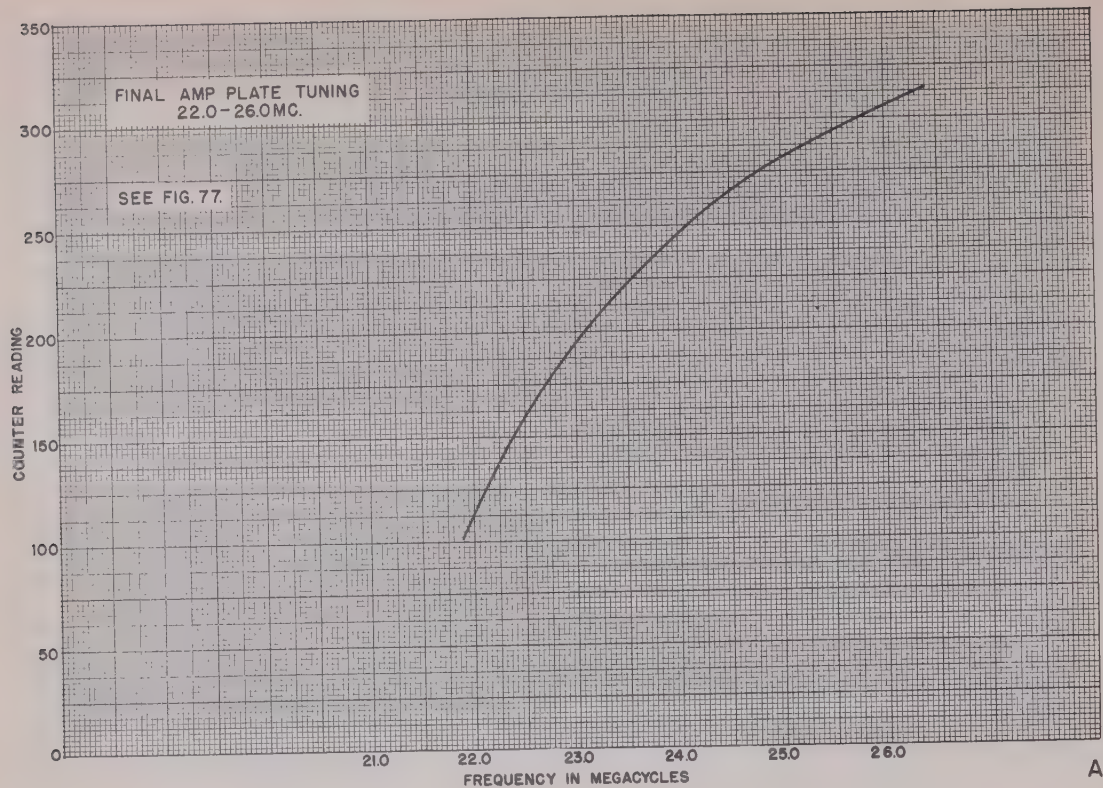
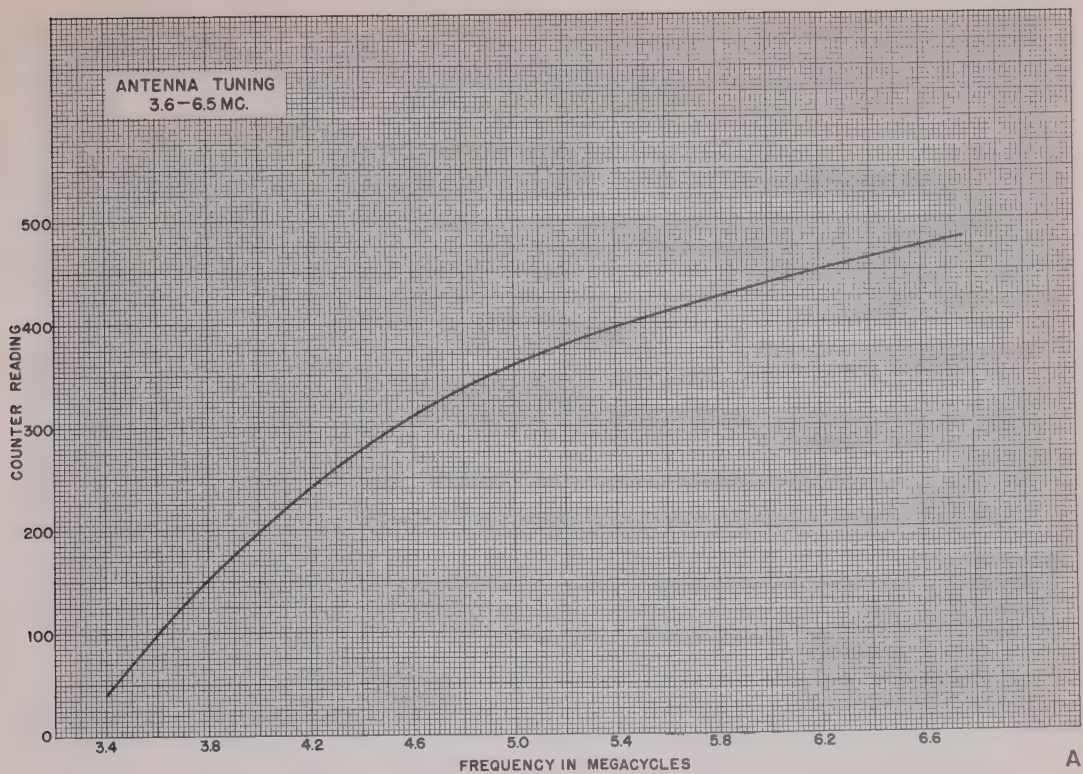
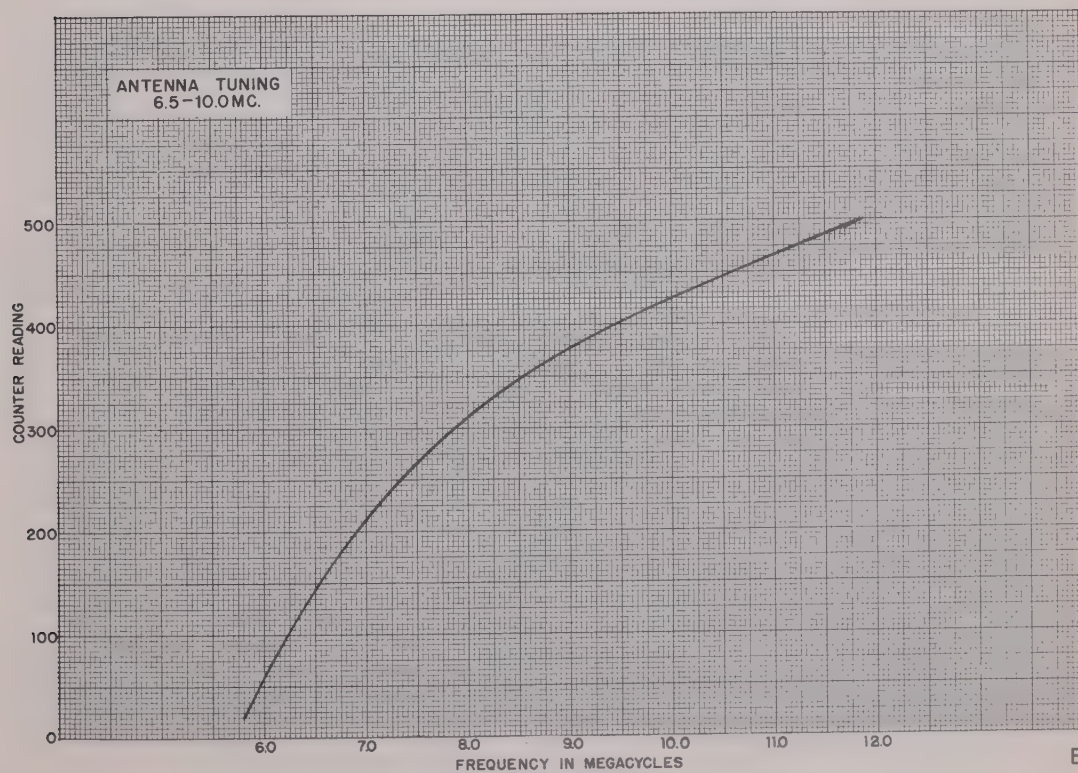


Figure 86. Radio Transmitter Model 96D, final amplifier plate tuning curve for 22.0 to 26.0 mc and antenna tuning curve for 2.0 to 3.6 mc



A



B

Figure 87. Radio Transmitter Model 96D, antenna tuning curves for 3.6 to 10.0 mc

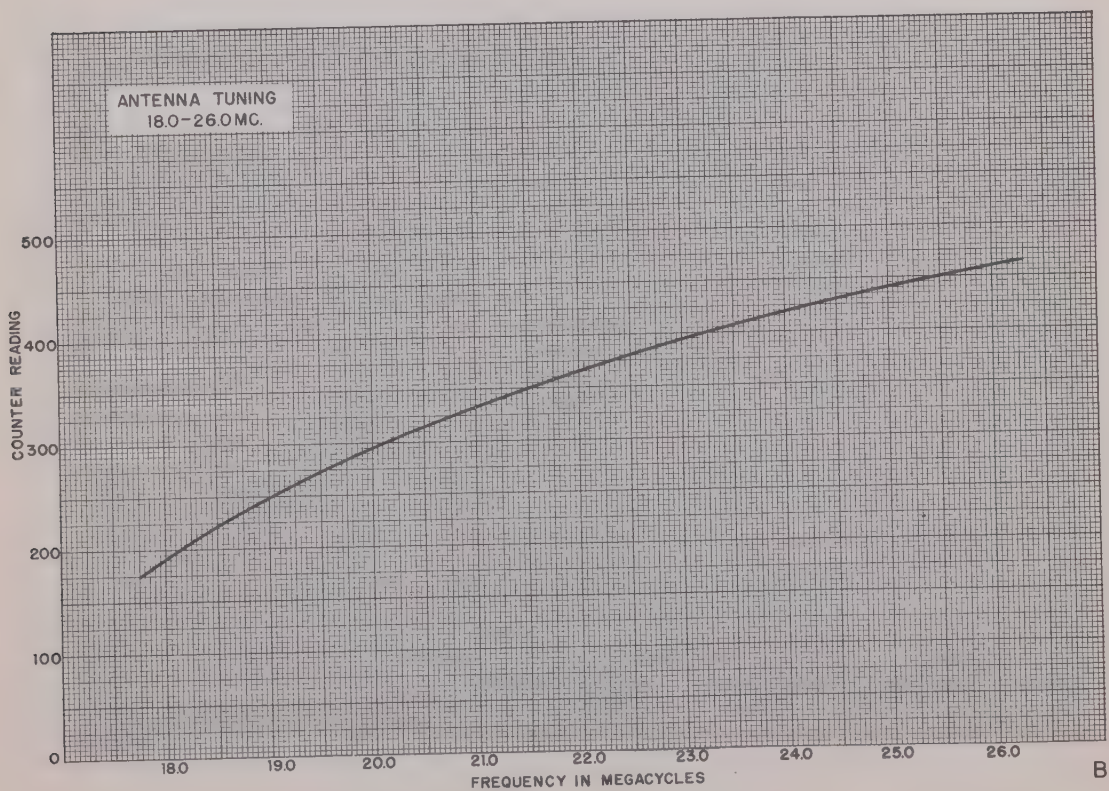
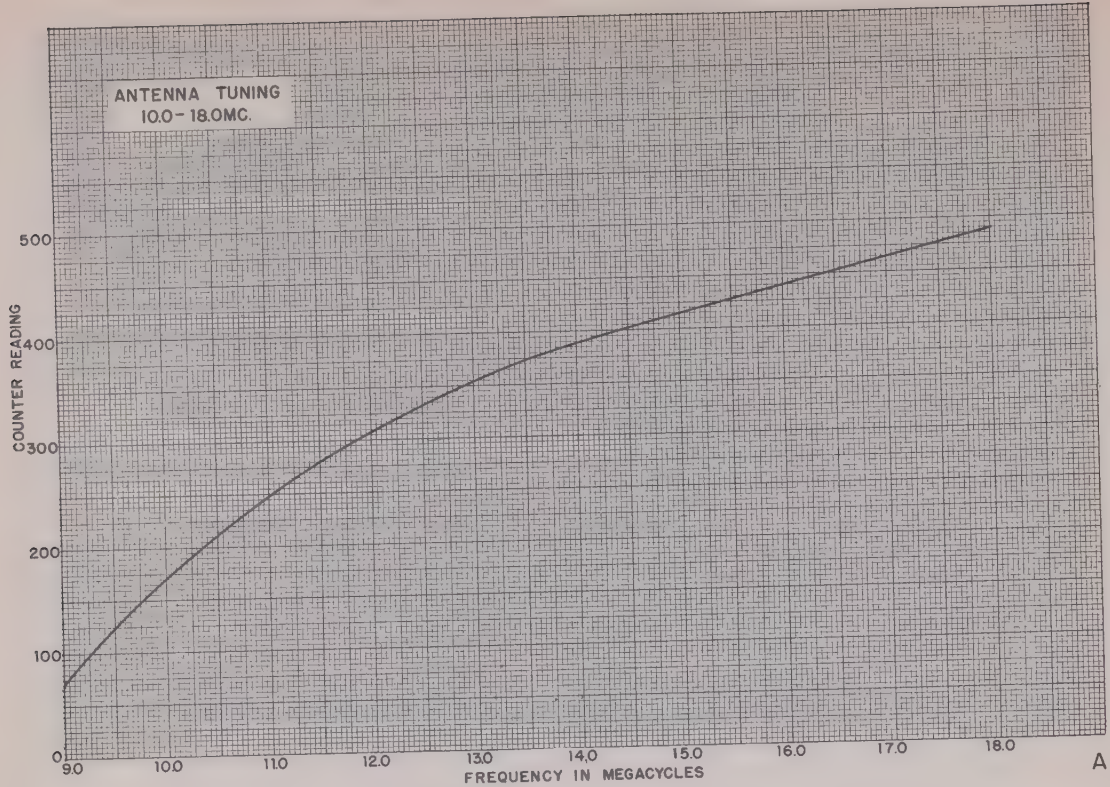
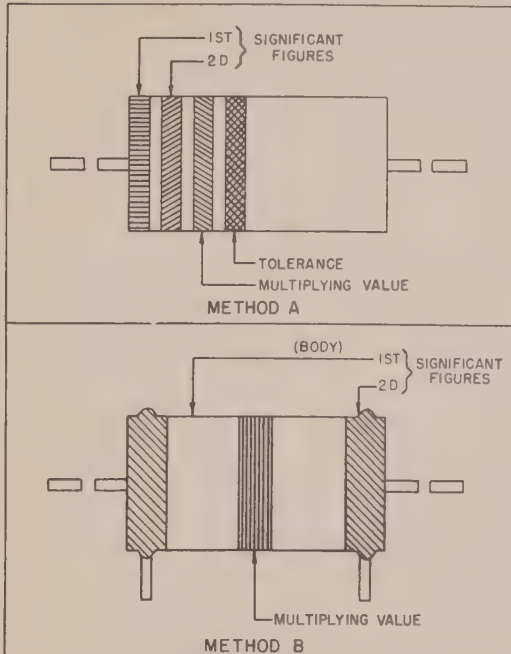


Figure 88. Radio Transmitter Model 96D, antenna tuning curves for 10.0 to 26.0 mc

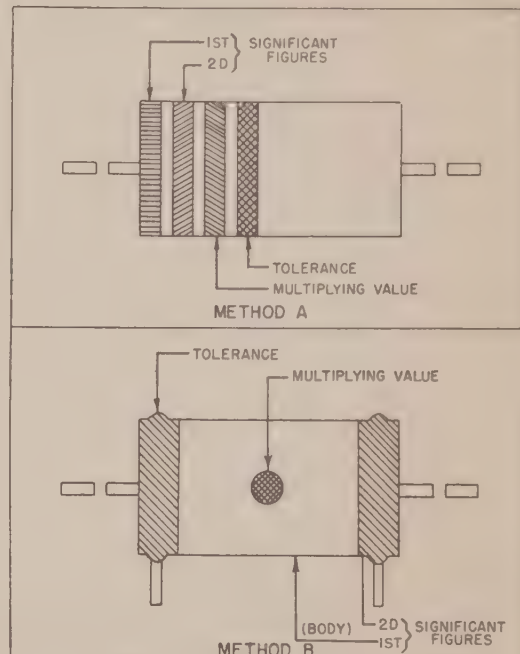
RESISTOR COLOR CODES

RMA COLOR CODE FOR FIXED COMPOSITION RESISTORS*



A

JAN COLOR CODE FOR FIXED COMPOSITION RESISTORS†



B

COLOR	SIGNIFICANT FIGURE	MULTIPLYING VALUE	TOLERANCE (%)
BLACK	0	1	± —
BROWN	1	10	± 1
RED	2	100	± 2
ORANGE	3	1,000	± 3
YELLOW	4	10,000	± 4
GREEN	5	100,000	± 5
BLUE	6	1,000,000	± 6
VIOLET	7	10,000,000	± 7
GRAY	8	100,000,000	± 8
WHITE	9	1,000,000,000	± 9
GOLD	—	0.1	± 5
SILVER	—	0.01	± 10
NO COLOR	—	—	± 20

NOTES

* INSULATED FIXED COMPOSITION RESISTORS WITH AXIAL LEADS ARE DESIGNATED BY A NATURAL TAN BACKGROUND COLOR. NON-INSULATED FIXED COMPOSITION RESISTORS WITH AXIAL LEADS ARE DESIGNATED BY A BLACK BACKGROUND.

† RESISTORS WITH AXIAL LEADS ARE INSULATED. RESISTORS WITH RADIAL LEADS ARE NON-INSULATED.

RMA: RADIO MANUFACTURERS ASSOCIATION

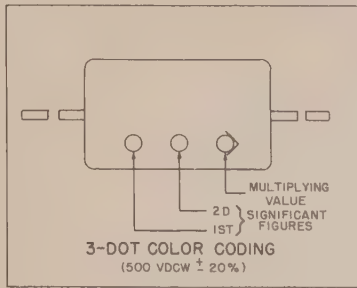
JAN: JOINT ARMY-NAVY

THESE COLOR CODES GIVE ALL RESISTANCE VALUES IN OHMS

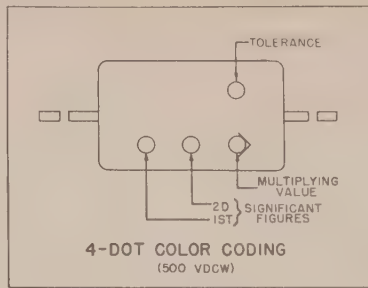
Figure 89. Resistor color code

CAPACITOR COLOR CODES

RMA 3-4-5-8-6-DOT COLOR CODES FOR MICA-DIELECTRIC CAPACITORS

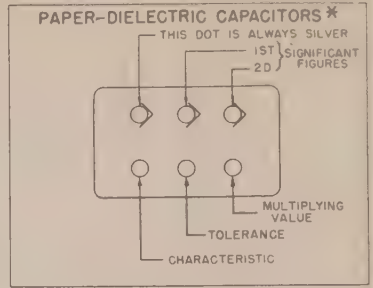


A

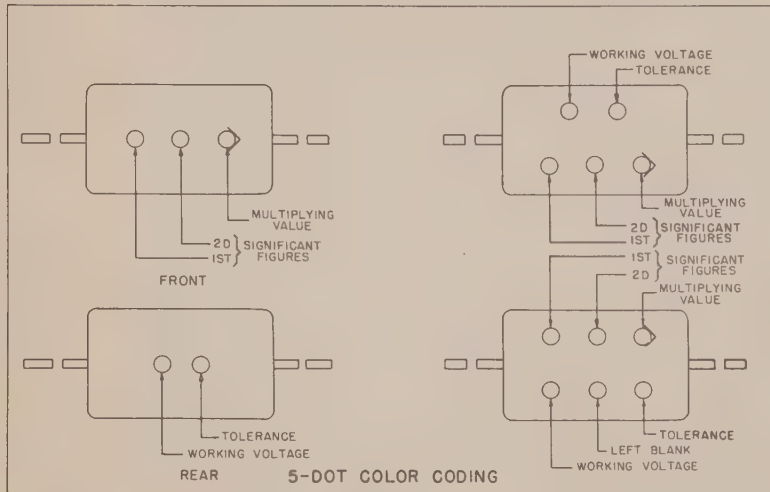


B

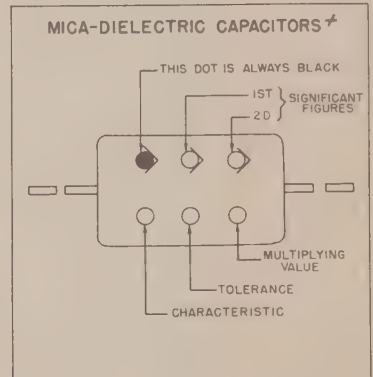
JAN 6-DOT COLOR CODES FOR:



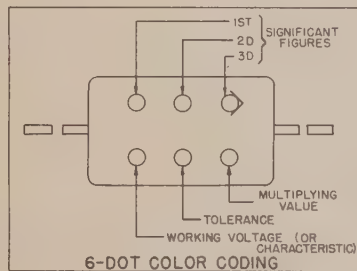
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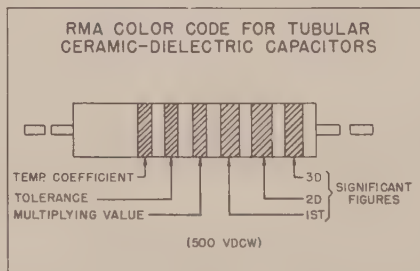
C



G

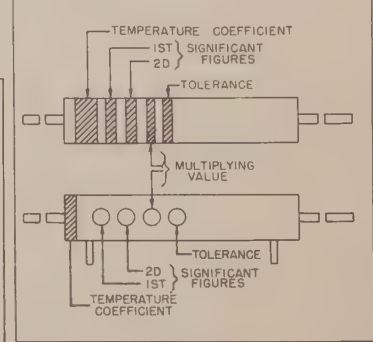


D



E

CERAMIC-DIELECTRIC CAPACITORS **

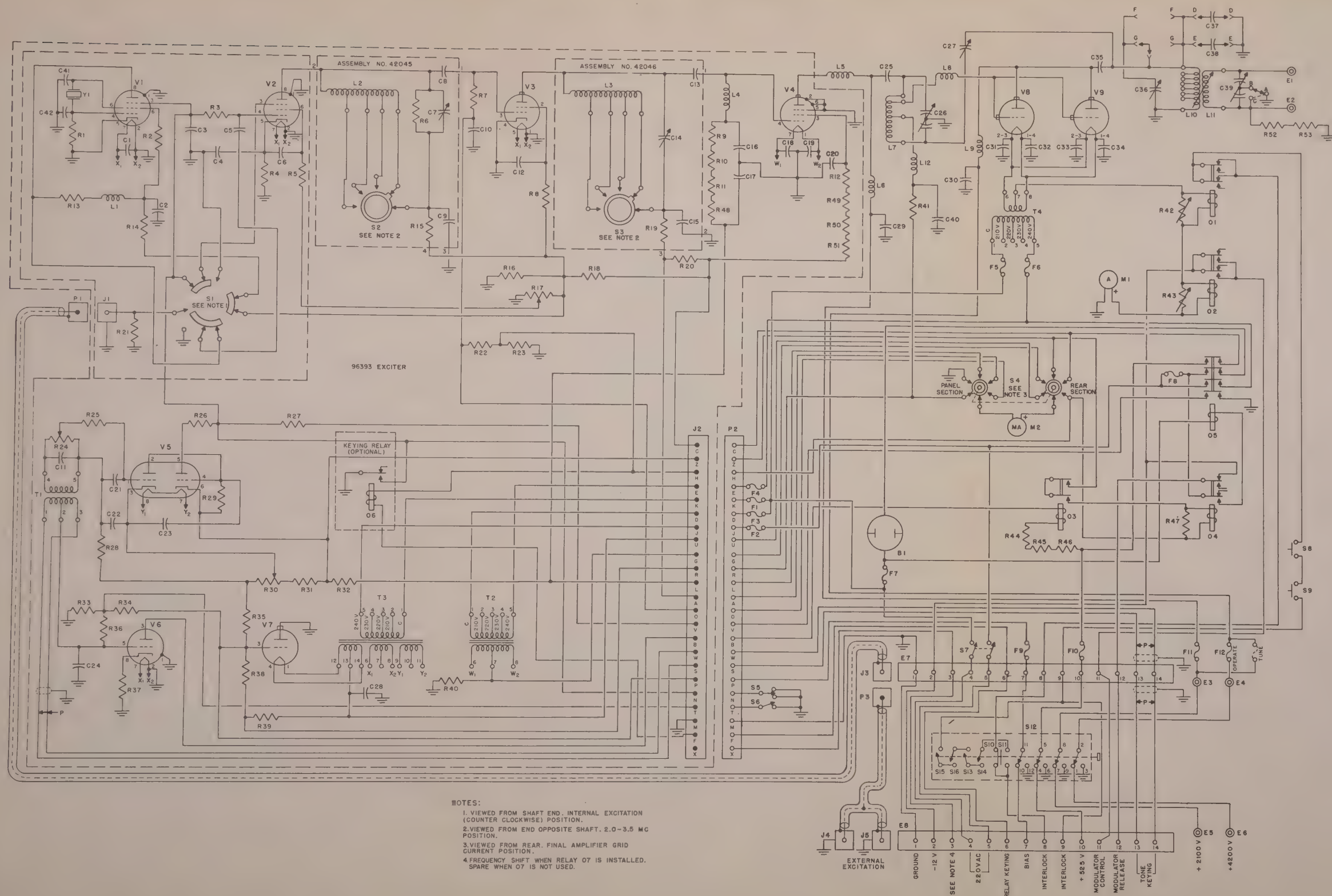


H

COLOR	SIGNIFICANT FIGURE	MULTIPLYING VALUE			RMA VOLTAGE RATING
		RMA MICA-AND CERAMIC-DIELECTRIC	JAN MICA-AND PAPER-DIELECTRIC	JAN CERAMIC-DIELECTRIC	
BLACK	0	1	1	1	-
BROWN	1	10	10	10	100
RED	2	100	100	100	200
ORANGE	3	1,000	100	1,000	300
YELLOW	4	10,000	1,000		400
GREEN	5	100,000	10,000		500
BLUE	6	1,000,000			600
VIOLET	7	10,000,000			700
GRAY	8	100,000,000		0.01	800
WHITE	9	1,000,000,000		0.1	900
GOLD	-	0.1	0.1		1,000
SILVER	-	0.01	0.01		2,000
NO COLOR	-				500

NOTES
* THE SILVER DOT IDENTIFIES THIS MARKING. FOR WORKING VOLTAGES SEE JAN TYPE DESIGNATION CODE.
† THE BLACK DOT IDENTIFIES THIS MARKING. FOR WORKING VOLTAGES SEE JAN TYPE DESIGNATION CODE.
** CAPACITORS MARKED WITH THIS CODE HAVE A VOLTAGE RATING OF 500 VDCW. EITHER THE BAND OR DOT CODE MAY BE USED FOR BOTH INSULATED (AXIAL-LEAD) OR UNINSULATED (RADIAL-LEAD) CAPACITORS.
RMA: RADIO MANUFACTURERS ASSOCIATION JAN: JOINT ARMY-NAVY THESE COLOR CODES GIVE CAPACITANCES IN MICROMICROFARADS.

Figure 90. Capacitor color code



- NOTES:
1. VIEWED FROM SHAFT END, INTERNAL EXCITATION (COUNTER CLOCKWISE) POSITION.
 2. VIEWED FROM END OPPOSITE SHAFT, 2.0-3.5 MC POSITION.
 3. VIEWED FROM REAR, FINAL AMPLIFIER GRID CURRENT POSITION.
 4. FREQUENCY SHIFT WHEN RELAY 07 IS INSTALLED, SPARE WHEN 07 IS NOT USED.

MEGACYCLES	SYMBOL	PART NO.
2.0-6.5	L6A-L9A-L12A	38598
6.5-18.0	L6B-L9B-L12B	38599
18.0-26.0	L6C-L9C-L12C	38600
2.0-3.6	L7A	42000
3.6-7.0	L7B	42001
7.0-10.0	L7C	42002
10.0-14.0	L7D	42003
14.0-18.0	L7E	42004
18.0-22.0	L7F	42005
22.0-26.0	L7G	42006
2.0-3.6	L11A	42006
3.6-6.5	L11B	42007
6.5-10.0	L11C	42008
10.0-18.0	L11D	42009
18.0-26.0	L11E	42010

NO.	DESCRIPTION	PART NO.
S13	SWITCH-INTERLOCK	10027
S14	"	10027
S15	"	10027
S16	"	10027

NO.	DESCRIPTION	PART NO.
T1	TRANS.-TONE KEYING	840005
T2	" 3RD AMPL. FILA.	842010
T3	" EXCITER FILA.	842011
T4	" FINAL AMPL. FILA.	842012

NO.	DESCRIPTION	PART NO.
V1	TUBE-OSCILLATOR	6AC7
V2	" 1ST AMPLIFIER	6AC7
V3	" 2ND	807
V4	" 3RD	813
V5	" TONE KEYING	6SN7
V6	" CHANNEL CONTROL	6J5
V7	" BIAS ISOLATOR	811
V8	" FINAL AMPLIFIER	450T1
V9	"	450T1
Y1	CRYSTAL UNIT-SINGLE	47385
Y1	CRYSTAL UNIT-DUAL	47400

NO.	DESCRIPTION	PART NO.
R1	10 MEGOHM	851073
R2	27	852793
R3	SAME AS R1	
R4	270 OHM	852794
R5	68,000	851070
R6	22,000	851061
R7	SAME AS R6	
R8	1,000 OHM	851038
R9	10,000	852056
R10	SAME AS R9	
R11	"	
R12	6,800 OHM	852053
R13	820	852795
R14	SAME AS R8	
R15	"	
R16	10,000 OHM	37W 857006
R17	100,000	VAR 54134
R18	8,000	37W 857002
R19	120	2W 852796
R20	.402	1/2 W 863002
R21	.47	1W 851014
R22	.25	1/2 W 863003
R23	800	15W 857003
R24	0 MEGOHM	VAR 54125
R25	39,000 OHM	1W 852797
R26	10,000	1W 851053
R27	SAME AS R1	
R28	"	
R29	"	
R30	250 OHM	VAR 54128
R31	1,200	15W 857004
R32	4.7	1/2 W 863004
R33	47,000	1W 851067
R34	39 MEGOHM	1W 852799
R35	SAME AS R18	
R36	18,000 OHM	1W 852804
R37	470	1W 851032
R38	SAME AS R1	
R39	"	
R40	200 OHM	1/2 W 863005
R41	5,000	110 W 858007
R42	25	VAR 868002
R43	SAME AS R42	
R44	8,200 OHM	2W 852783

NO.	DESCRIPTION	PART NO.
L1	CHOKE-OSCILLATOR	38595
L2	INDUCTOR-1ST AMPL. PLATE	42043
L3	" 2ND	"
L4	CHOKE-3RD AMPL. GRID	38615
L5	" PARA	38597
L6	" PLATE	SEE LIST
L7	INDUCTOR	SEE LIST
L8	CHOKE-FINAL AMPL. PARA	38600
L9	" PLATE	SEE LIST
L10	INDUCTOR	42077
L11	INDUCTOR ANTENNA	SEE LIST
L12	CHOKE-FINAL AMPL. GRID	SEE LIST

NO.	DESCRIPTION	PART NO.
C1	01 MF	300V 816515
C2	001	500V 816269
C3	SAME AS C1	
C4	"	
C5	"	
C6	"	
C7	"	
C8	"	
C9	"	
C10	"	
C11	0051 MF	500V 816551
C12	SAME AS C2	
C13	"	
C14	"	
C15	"	
C16	"	
C17	"	
C18	"	
C19	"	
C20	"	
C21	"	
C22	"	
C23	"	
C24	"	
C25	"	
C26	"	
C27	"	
C28	"	
C29	"	
C30	"	
C31	"	
C32	"	
C33	"	
C34	"	
C35	"	
C36	"	
C37	"	
C38	"	
C39	"	
C40	"	
C41	"	
C42	"	

NO.	DESCRIPTION	PART NO.
O1	RELAY-OVERLOAD	11736
O2	" UNDERLOAD	11736
O3	" CHANNEL CONT.	11748
O4	"	
O5	" BIAS PROTECTN.	11747
O6	" CHANNEL OPERATE	11737
O7	" KEY-NG	11724
O8	" XTAL SHIFTER	11791
O9	"	
O10	"	
O11	"	
O12	"	
O13	"	
O14	"	
O15	"	
O16	"	
O17	"	
O18	"	
O19	"	
O20	"	
O21	"	
O22	"	
O23	"	
O24	"	
O25	"	
O26	"	
O27	"	
O28	"	
O29	"	
O30	"	
O31	"	
O32	"	
O33	"	
O34	"	
O35	"	
O36	"	
O37	"	
O38	"	
O39	"	
O40	"	
O41	"	
O42	"	

NO.	DESCRIPTION	PART NO.
F1	FUSE 1 AMP 250V	14088
F2	SAME AS F1	
F3	"	
F4	"	
F5	2 AMP SLO-BLO 250V	14086
F6	SAME AS F5	
F7	2.5 AMP SLO-BLO 250V	14085
F8	SAME AS F7	
F9	.5 AMP	1,000V 14054
F10	SAME AS F9	
F11	.75 AMP	2,500V 14082
F12	1.5	5,000V 14091

NO.	DESCRIPTION	PART NO.
J1	RECEPT. FEMALE COAX.	29563
J2	" MALE 23 CONT	29817
J3	SAME AS J1	
J4	RECEPT MALE COAX.	29528
J5	SAME AS J1	

NO.	DESCRIPTION	PART NO.
S1	SWITCH-EXCITATION	10237
S2	" FIRST AMPL. SAME	10236
S3	" SEC.	10236
S4	" METER	10238
S5	" TEST	812004
S6	" LOCAL CHANNEL	812003
S7	" 220V DISCONNECT	812001
S8	" FUSE DOOR INTLK.	10026
S9	" SLIDE INTLK.	10026
S10	" HV INTLK.	10026
S11	" INTLK. BYPASS	10026
S12	" HV DISCONNECT	96881
T1	TRANS.-TONE KEYING	840005
T2	" 3RD AMPL. FILA.	842010
T3	" EXCITER FILA.	842011
T4	" FINAL AMPL. FILA.	842012

NO.	DESCRIPTION	PART NO.
P1	PLUG-MALE COAX.	28573
P2	" FEMALE 23 CONT.	28681
P3	SAME AS P1	

NO.	DESCRIPTION	PART NO.
E1	INSULATOR ANT. TERM.	871001
E2	SAME AS E1	871002
E3	INSULATOR 2,100V TERM.	870501
E4	" 4,200V	870501
E5	" 2,100V	871001
E6	" 4,200V	871001
E7	SLIDE TERMINAL BOARD	31563
E8	CABINET	31563

NO.	DESCRIPTION	PART NO.
F1	FUSE 1 AMP 250V	14088
F2	SAME AS F1	
F3	"	
F4	"	
F5	2 AMP SLO-BLO 250V	14086
F6	SAME AS F5	
F7	2.5 AMP SLO-BLO 250V	14085
F8	SAME AS F7	
F9	.5 AMP	1,000V 14054
F10	SAME AS F9	
F11	.75 AMP	2,500V 14082
F12	1.5	5,000V 14091

NO.	DESCRIPTION	PART NO.
J1	RECEPT. FEMALE COAX.	29563
J2	" MALE 23 CONT	29817
J3	SAME AS J1	
J4	RECEPT MALE COAX.	29528
J5	SAME AS J1	

NO.	DESCRIPTION	PART NO.
S1	SWITCH-EXCITATION	10237
S2	" FIRST AMPL. SAME	10236
S3	" SEC.	10236
S4	" METER	10238
S5	" TEST	812004
S6	" LOCAL CHANNEL	812003
S7	" 220V DISCONNECT	812001
S8	" FUSE DOOR INTLK.	10026
S9	" SLIDE INTLK.	10026
S10	" HV INTLK.	10026
S11	" INTLK. BYPASS	10026
S12	" HV DISCONNECT	96881
T1	TRANS.-TONE KEYING	840005
T2	" 3RD AMPL. FILA.	

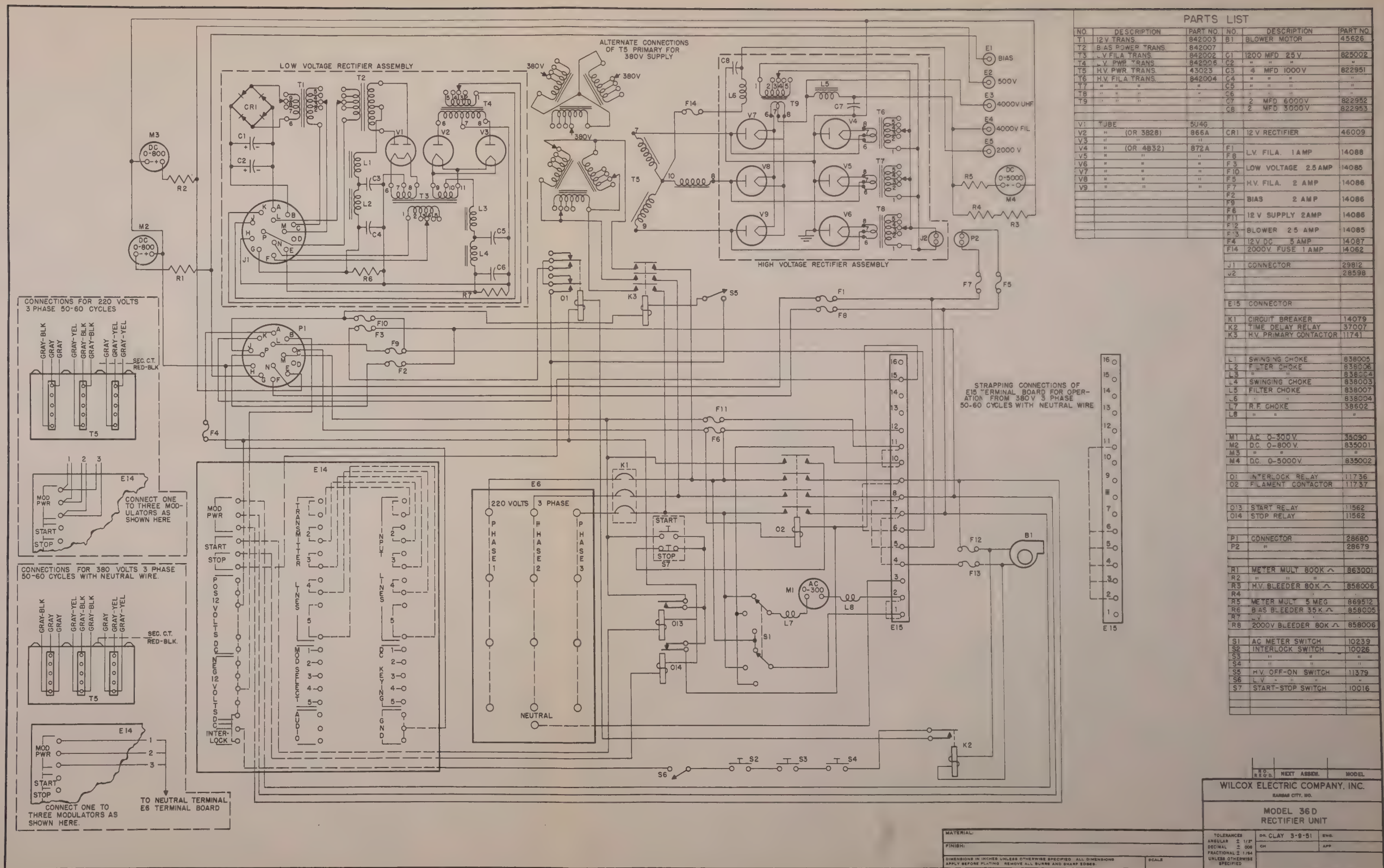


Figure 92. Rectifier Power Unit Model 36D, Schematic Diagram. (220 or 380-415 volt ac power source).

